

FIELD ACTIVITIES AND DATA REPORT

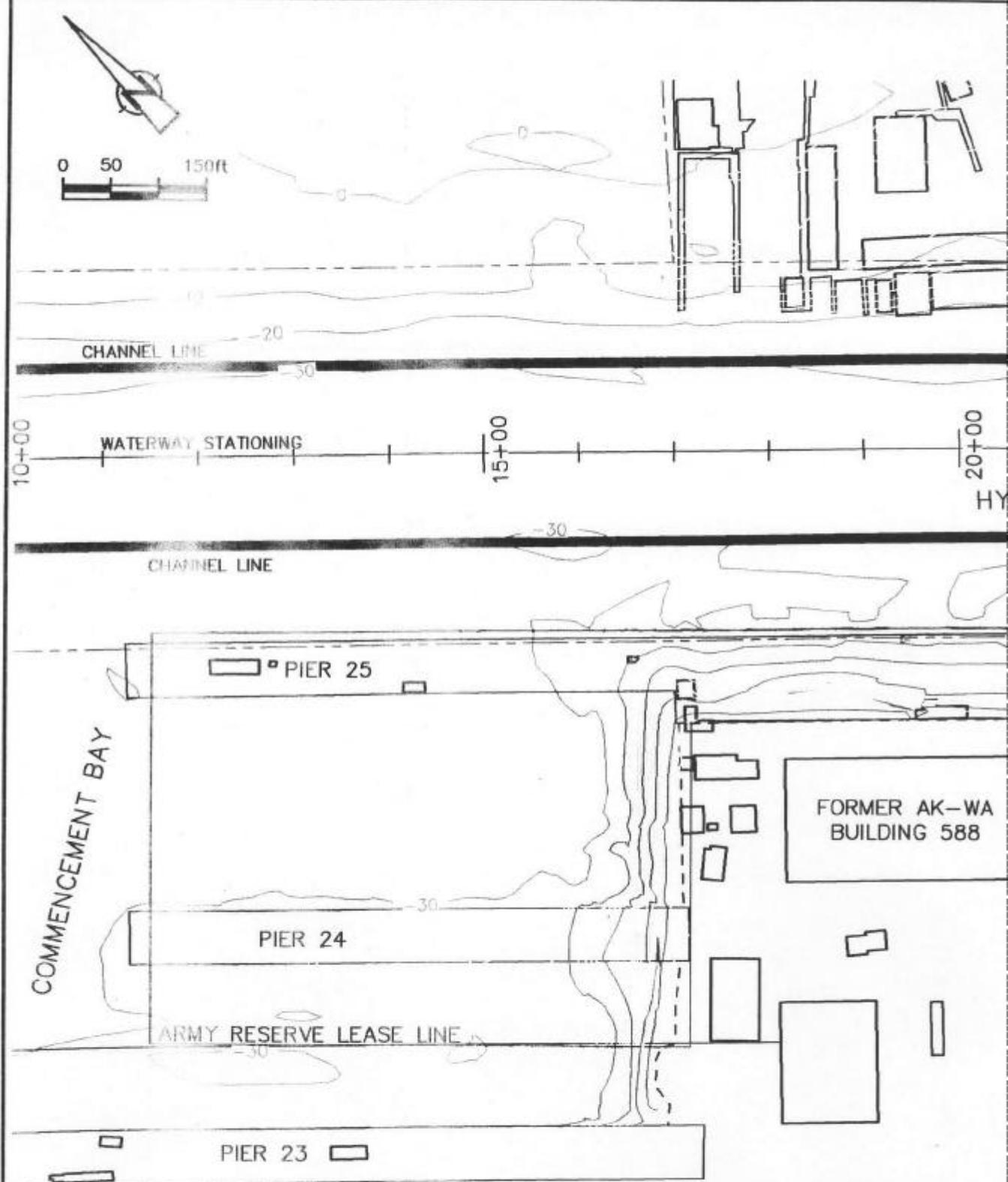
**Embankment Beneath Pier 25
Port of Tacoma Industrial Yard**

MAY 1998

REF. NO. 7842-80 (11)

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CONESTOGA-ROVERS & ASSOCIATES



LEGEND

SOURCES: HARROWER, NOVEMBER 1997
 BATHYMETRY, STRIPLIN et al., 1997,
 AND BLUE WATER ENGINEERING, 1997

- -30— ELEVATION CO.
- - - PROPERTY LINE
- - - STUDY AREA
- - - AREA SAMPLE

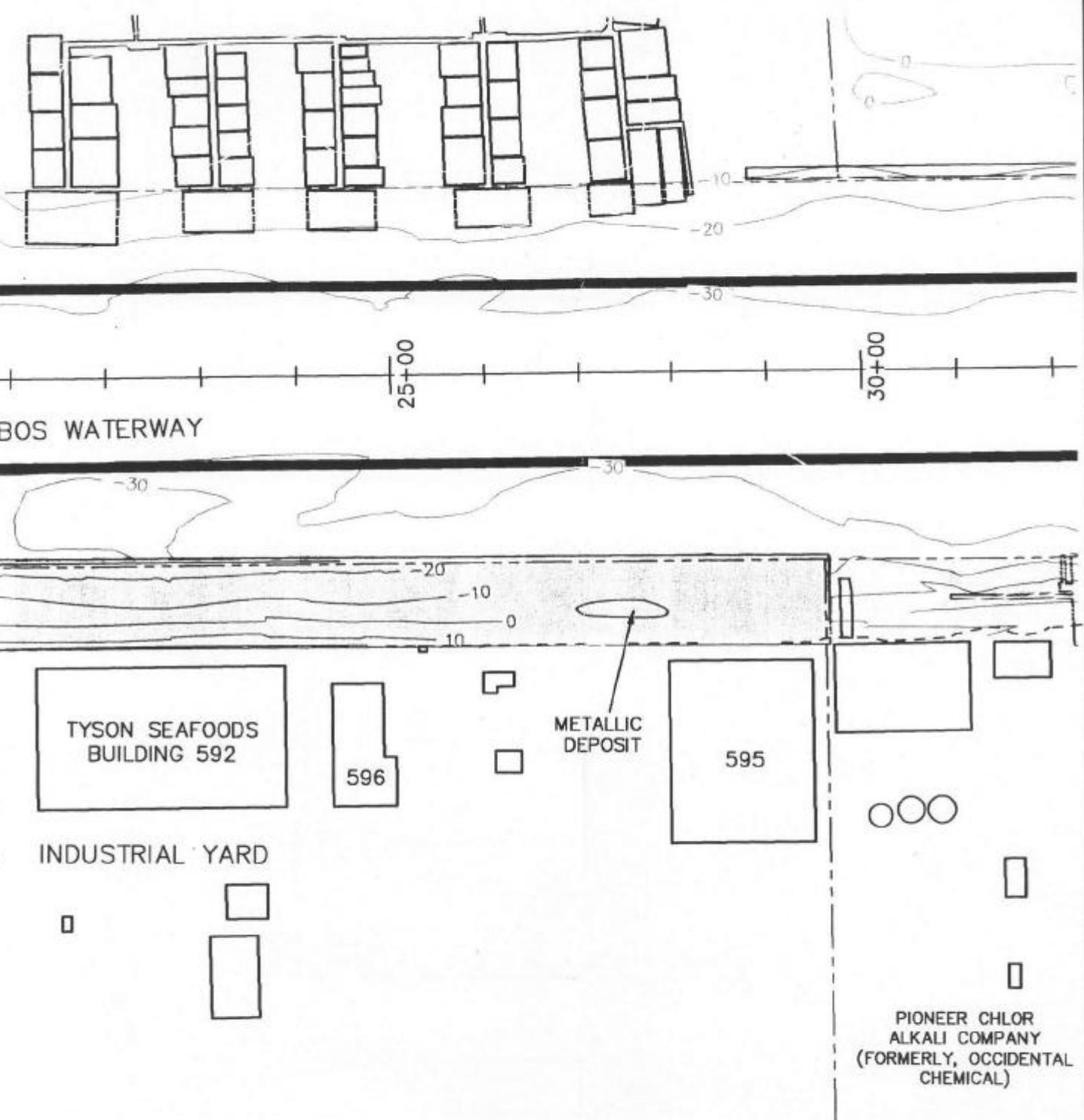
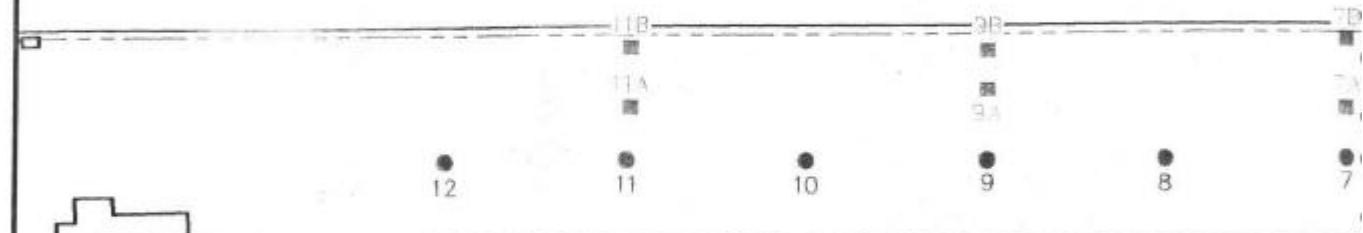


figure 1
PRE-REMEDIAL DESIGN STUDY AREA
PORT OF TACOMA PIER 25 SAMPLING
OCC Tacoma, Inc.

HYLEBOS WATERWAY



INDUSTRIAL YARD

LEGEND

- PROPERTY LINE
- BANK SAMPLE LOCATION
- SIDE-SLOPE SAMPLE LOCATION
- ▲ SAMPLE OF METALLIC DEPOSIT

NOTE:
LOCATION 1B WAS

SOURCES: HARTCROWSER, NOVEMBER 1997
BATHYMETRY, STRIPLIN et al., 1997,
AND BLUE WATER ENGINEERING, 1997

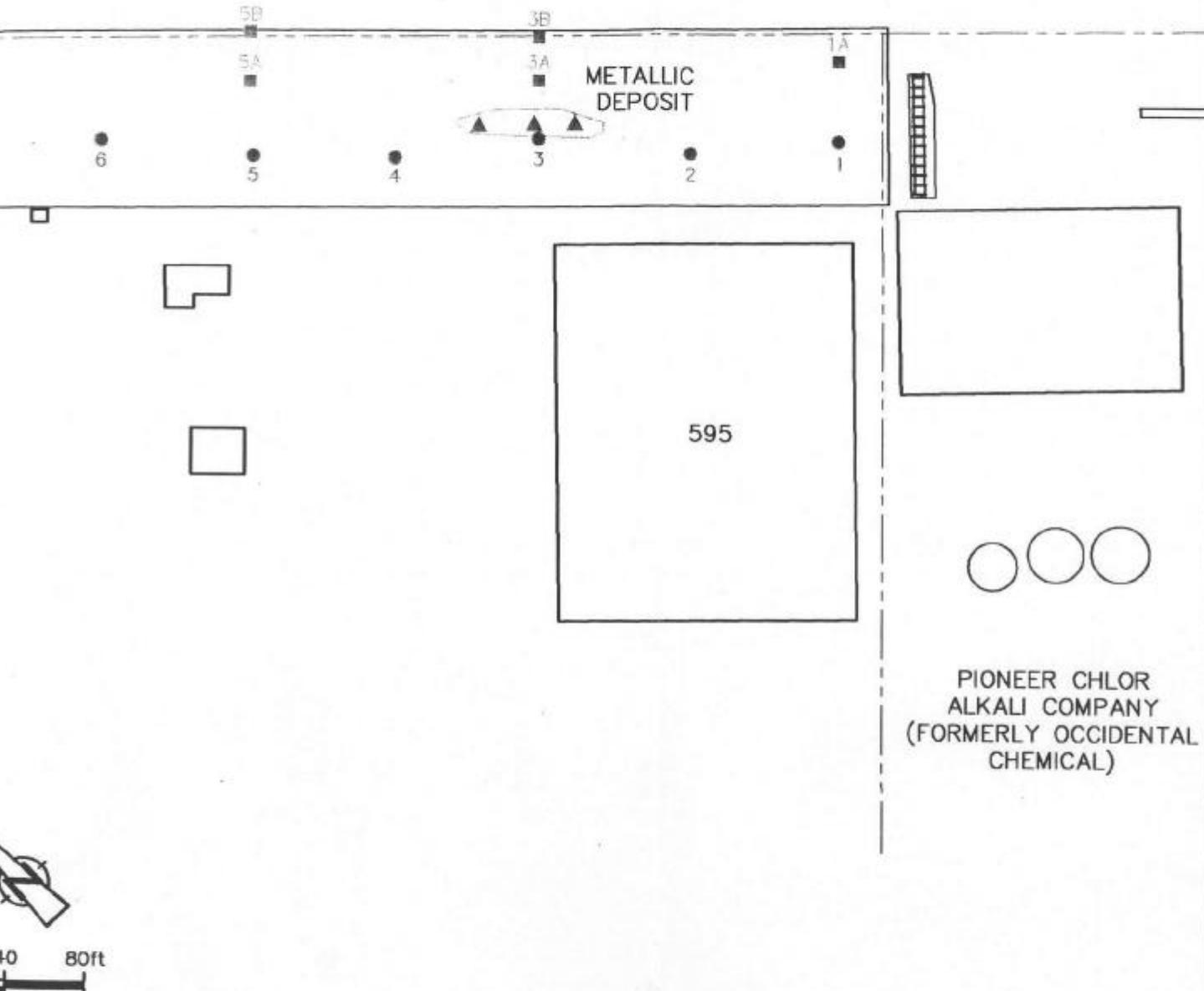


figure 2

BANK AND SIDE-SLOPE SAMPLE LOCATIONS
PORT OF TACOMA PIER 25 SAMPLING
OCC Tacoma, Inc.

TABLE OF CONTENTS

| | <u>Page</u> |
|---|-------------|
| 1.0 INTRODUCTION..... | 1 |
| 2.0 FIELD ACTIVITIES | 2 |
| 2.1 BANK SAMPLING AND ANALYSES | 2 |
| 2.2 SIDE-SLOPE SAMPLING AND ANALYSES | 2 |
| 3.0 DATA | 3 |
| 3.1 CHEMICAL DATA..... | 3 |
| 3.2 PHYSICAL DATA | 3 |

LIST OF FIGURES
(Following Report)

FIGURE 1 PRE-REMEDIAL DESIGN STUDY AREA

FIGURE 2 BANK AND SIDE SLOPE SAMPLE LOCATIONS

LIST OF TABLES

TABLE 2.1 SAMPLE KEY

LIST OF APPENDICES

- | | |
|------------|---|
| APPENDIX A | ANALYTICAL DATA AND VALIDATION ASSESSMENT EMBANKMENT BENEATH PIER 25 |
| APPENDIX B | ANALYTICAL DATA AND VALIDATION ASSESSMENT HIGH RESOLUTION PCB ANALYSES |
| APPENDIX C | PHYSICAL TESTING DATA |

1.0 INTRODUCTION

The Port of Tacoma (POT) is conducting a Pre-Remedial Design (PRD) Study of the bank and side-slope areas adjacent to the POT Industrial Yard located on the Hylebos side and Commencement Bay side of the terminal peninsula between the Hylebos and Blair Waterways. OCC Tacoma, Inc. (OCCT) is participating in this study by conducting the sampling and analysis activities at the southern end of Pier 25 between the POT/Pioneer Chlor Alkali Company (former OCC Tacoma Facility) property boundary and the north end of the Tyson Seafoods Building (Building 592). The investigative area is presented on Figure 1.

The objective of this PRD Study is to collect data to assess the physical and chemical characteristics of the bank and side-slope areas.

This report describes the field activities conducted by OCCT and presents the resultant data. The report is organized as follows:

- i) Section 1.0 - Introduction: The introduction presents a project overview and the organization of the report;
- ii) Section 2.0 - Field Activities: The field activities conducted by OCCT are summarized in Section 2.0;
- iii) Section 3.0 - Chemical Data: The validated chemical data from the analyses of the samples collected by OCCT are presented in Section 3.0; and
- iv) Section 4.0 - Physical Data: The physical testing data from the samples collected by OCCT are presented in Section 4.0.

2.0 FIELD ACTIVITIES

The field activities performed by OCCT consisted of the sampling, physical characterization, and chemical analysis of:

- i) surface sediment deposited on the bank; and
- ii) surface and subsurface sediment deposited on the side-slope.

The OCCT field activities were conducted between January 9 and 21, 1998 in accordance with the "Sampling and Analysis Plan, Embankment Beneath Pier 25" (SAP) dated January 1998 and as described below.

2.1 BANK SAMPLING AND ANALYSES

Thirteen samples were collected from the bank locations shown on Figure 2. All samples were collected, prepared, and analyzed in accordance with the procedures contained in the SAP. A sample collection and analysis summary is presented in Table 2.1.

2.2 SIDE-SLOPE SAMPLING AND ANALYSES

Thirty-three samples were collected from the 11 side-slope locations shown on Figure 2. Surface (0 to 0.3 foot below ground surface [BGS]) sediment samples were collected using a VanVeen sampler. The sediment core samples were collected using a stainless steel piston core sampler which was advanced and retrieved by a drill rig positioned on the dock over the sample location. The core samples were divided into two sub-samples by depth (0 to 1.5 feet BGS and 1.5 to 3.0 feet BGS) with the exception of the sample collected from location 5A which was subdivided by geologic boundary into two samples: 0 to 1.0 foot BGS (sand, silt), and 1.0 to 3.0 feet BGS (sludge-like material).

The side-slope sample collection and analyses details are presented in Table 2.1.

3.0 DATA

3.1 CHEMICAL DATA

All samples were analyzed in accordance with the requirements presented in the SAP. As required, samples from the bank locations at elevation 0 Mean Lower Low Water (MLLW) (1, 3, 5, 7, 9, and 11) where polychlorinated biphenyl (PCB) Aroclors were reported above 300 µg/Kg (3, 9, and 11) were analyzed for PCB congeners.

All chemical analytical data have been reviewed for Quality Assurance/Quality Control (QA/QC) and data validation reports are contained in Appendix A. The analytical database is presented in Table 2 of each validation report.

3.2 PHYSICAL DATA

Grain size distribution and Atterberg limits were determined for selected representative bank and side-slope samples. The results of the physical testing are presented in Appendix B.

FIGURES

FIGURES

TABLES

TABLES

SAMPLE KEY
PIER 25 SEDIMENT SAMPLING
PORT OF TACOMA EMBANKMENT
TACOMA, WASHINGTON

| Date | Location ID | Interval (Ft. BGS) | Matrix | Description | Sample No. | Sample Depth (Ft. EGS) | Analyses | Laboratory |
|----------|-------------|-----------------------|----------|--|--|---|--|--------------------------------------|
| 01/09/98 | 1 | 0 to 0.5 | Sediment | SM - SAND, silt | PT-010998-CFD-002 | 0 to 0.5 | Pier 25 Parameters; ⁽¹⁾ PCB Congener Analyses | ARI Alta |
| 01/21/98 | 1A | 0 to 1.5 | Sediment | SP - SAND, trace silt, loose, very fine, poorly graded, brown/gray, wet, chemical-like odor, sheen | SE-012198-JOS-33 SE-012198-JOS-34 SE-012198-JOS-35 | 0 to 0.3 0 to 1.5 1.5 to 3.0 | Pier 25 Parameters Grain Size, Atterberg Limits Pier 25 Parameters Pier 25 Parameters | ARI Soil Technology ARI ARI |
| 01/09/98 | 2 | 0 to 0.5 | Sediment | SW/GW - SAND/GRAVEL, silt | PT-010998-CFD-011 | 0 to 0.5 | Pier 25 Parameters | ARI |
| 01/09/98 | 3 | 0 to 0.33 | Sediment | SM/ML - SAND, SILT | PT-010998-CFD-008 PT-010998-CFD-009 | 0 to 1.33 0 to 0.33 (Dup) | Pier 25 Parameters PCB Congener Analyses Pier 25 Parameters PCB Congener Analyses | ARI Alta ARI Alta |
| 01/21/98 | 3A | 0 to 0.4 | Sediment | SM/ML - SAND, SILT, loose, fine, poorly graded, brown/gray, wet slag, shell, wood, sheen | SE-012198-JOS-26 SE-012198-JOS-27 SE-012198-JOS-28 SE-012198-JOS-29 | 0 to 0.3 0 to 0.3 (Dup) 0 to 1.5 (MS/MSD) 1.5 to 3.0 | Pier 25 Parameters Pier 25 Parameters Pier 25 Parameters Pier 25 Parameters | ARI ARI ARI ARI |
| 01/21/98 | 3B | 0 to 0.5 | Sediment | SM - SAND, SILT, trace gravel, loose, fine grained, poorly graded, brown/gray, wet, wood, shell | SE-012198-JOS-30 SE-012198-JOS-31 SE-012198-JOS-32 | 0 to 0.3 0 to 1.5 (MS/MSD) 1.5 to 3.0 | Grain Size, Atterberg Limits | Soil Technology |
| 01/09/98 | 4 | 0 to 0.33 | Sediment | SM/GW - SAND/GRAVEL | PT-010998-CFD-003 | 0 to 0.33 | Pier 25 Parameters | ARI |
| 01/09/98 | 5 | 0 to 0.42 | Sediment | ML/SM - SILT/SAND, shell | PT-010998-CFD-004 | 0 to 0.42 | PCB Congener Analyses Grain Size | ARI Alta |
| 01/20/98 | 5A | 0 to 0.5 | Sediment | SM/ML - SAND, SILT, trace gravel, loose, fine-medium grained, poorly graded, gray/brown, wet, shell, sheen | SE-012098-JOS-20 SE-012098-JOS-21 SE-012098-JOS-22 | 0 to 0.3 0 to 1.0 1.0 to 3.0 | Pier 25 Parameters Pier 25 Parameters Pier 25 Parameters | ARI ARI ARI |

SAMPLE KEY

PIER 25 SEDIMENT SAMPLING
PORT OF TACOMA EMBANKMENT
TACOMA, WASHINGTON

| Date | Location ID | Interval (Ft. BGS) | Matrix | Description | Sample No. | Sample Depth (Ft. BGS) | Analyses | Laboratory |
|----------|-------------|--------------------|----------|--|--|---|--|------------------------|
| 01/20/98 | 5B | 0 to 0.5 | Sediment | SM/ML - SAND, SILT, loose, very fine, poorly graded, brown/gray, wet | SE-012098-JOS-23 SE-012098-JOS-24 SE-012098-JOS-25 | 0 to 0.3 0 to 1.5 1.5 to 3.0 (MS/MSD) | Pier 25 Parameters Pier 25 Parameters Pier 25 Parameters | ARI ARI ARI |
| 01/09/98 | 6 | 0 to 0.33 | Sediment | SM/ML - SAND/SILT, clay, brick | PT-010998-CFD-014 | 0 to 0.33 | Pier 25 Parameters | ARI |
| 01/09/98 | 7 | 0 to 0.33 | Sediment | SM - SAND, shell | PT-010998-CFD-005 | 0 to 0.33 | Pier 25 Parameters PCB Congener Analyses | ARI Alta |
| 01/20/98 | 7A | 0 to 0.7 | Sediment | SM/ML - SAND, SILT, loose, fine grained, poorly graded, brown/gray, wet, shell | SE-012098-JOS-13 SE-012098-JOS-14 SE-012098-JOS-15 | 0 to 0.3 0 to 1.5 1.5 to 3.0 | Pier 25 Parameters Pier 25 Parameters Pier 25 Parameters | ARI ARI ARI |
| 01/20/98 | 7B | 0 to 0.3 | Sediment | ML - SILT, trace sand, soft, very fine, poorly graded, black, wet, sheen | SE-012098-JOS-16 | 1.5 to 3.0 (Dup) | Grain Size, Atterberg Limits Pier 25 Parameters | Soil Technology ARI |
| 01/09/98 | 8 | 0 to 0.33 | Sediment | SM/ML - SAND, SILT, loose, fine grained, poorly graded, brown/gray, wet | SE-012098-JOS-17 SE-012098-JOS-18 SE-012098-JOS-19 | 0 to 0.3 0 to 1.5 1.5 to 3.0 | Pier 25 Parameters Pier 25 Parameters Pier 25 Parameters | ARI ARI ARI |
| 01/09/98 | 9 | 0 to 0.33 | Sediment | GW/SM - GRAVEL/SAND, silt | PT-010998-CFD-006 | 0 to 0.33 | Pier 25 Parameters | ARI |
| 01/20/98 | 9A | 0 to 0.3 | Sediment | SM - SAND, silt | PT-010998-CFD-007 | 0 to 0.33 | Pier 25 Parameters PCB Congener Analyses | ARI Alta |
| 01/20/98 | 9B | 0 to 0.4 | Sediment | ML - SILT, trace sand, very soft, very fine, poorly graded, brown/gray, wet, sheen, wood, shell, metal | SE-012098-JOS-10 SE-012098-JOS-11 SE-012098-JOS-12 | 0 to 0.3 0 to 1.5 1.5 to 3.0 | Pier 25 Parameters Pier 25 Parameters Pier 25 Parameters | ARI ARI ARI |
| 01/09/98 | 10 | 0 to 0.33 | Sediment | ML - SILT, clay, gravel | PT-010998-CFD-012 | 0 to 3.3 | Pier 25 Parameters | ARI |

SAMPLE KEY
PIER 25 SEDIMENT SAMPLING
PORT OF TACOMA EMBANKMENT
TACOMA, WASHINGTON

| Date | Location ID | Interval (Ft. BGS) | Matrix | Description | Sample No. | Sample Depth (Ft. BGS) | Analyses | Laboratory |
|----------|------------------|-----------------------|-------------|---|--|------------------------------------|--|--------------------------------------|
| 01/09/98 | 11 | 0 to 0.33 | Sediment | GW/SM - GRAVEL, SAND, silt | PT-010998-CFD-010 | 0 to 0.33 | PCB Congener Analyses Grain Size | ARI Alt Soil Technology |
| 01/20/98 | 11A | 0 to 0.5 | Sediment | ML - SILT, trace gravel, soft, very fine, poorly graded, light gray, wet, bivalve shells | SE-012098-JOS-01 SE-012098-JOS-02 SE-012098-JOS-03 | 0 to 0.3 0 to 1.5 1.5 to 3.0 | Pier 25 Parameters Grain Size, Atterberg Limits Pier 25 Parameters Pier 25 Parameters | ARI Soil Technology ARI ARI |
| 01/20/98 | 11B | 0 to 0.5 | Sediment | ML - SILT, trace gravel, soft, very fine, poorly graded, light gray, wet, wood, bivalve shells, sheen | SE-012098-JOS-04 SE-012098-JOS-05 SE-012098-JOS-06 | 0 to 0.3 0 to 1.5 1.5 to 3.0 | Pier 25 Parameters Pier 25 Parameters Pier 25 Parameters | ARI ARI ARI |
| 01/09/98 | 12 | 0 to 0.33 | Sediment | SM - SAND, gravel | PT-010998-CFD-013 | 0 to 0.33 | Pier 25 Parameters | ARI |
| 01/09/98 | - | - | Rinse Water | Rinse Blank | PT-010998-JS-001 | b | Pier 25 Parameters | ARI |
| 01/20/98 | - | - | Rinse Water | Rinse blank of Shelly tube | W-012098-JOS-01 | b | Pier 25 Parameters | ARI |
| 01/21/98 | - | - | Rinse Water | Rinse blank of Van Veen Sampler | W-012198-JOS-02 | b | Pier 25 Parameters | ARI |
| 01/09/98 | Metallic Deposit | 0 to 0.5 | Debris | Metallic debris | PT-010998-CFD-015 | 0 to 0.5 | Pier 25 Parameters | ARI |

Notes:

(1) Listed in Table 4.1 of the Sampling and Analysis Plan.

Dup Duplicate.

Ft. BG Feet Below Ground Surface.

MS Matrix Spike.

MSD Matrix Spike Duplicate.

APPENDICES

APPENDIX A

ANALYTICAL DATA VALIDATION AND ASSESSMENT
EMBANKMENT BENEATH PIER 25
PORT OF TACOMA INDUSTRIAL YARD
TACOMA, WASHINGTON
JANUARY 1998

TABLE OF CONTENTS

| | <u>Page</u> |
|------------------------|-------------|
| A1.0 INTRODUCTION..... | 1 |
| A2.0 QA/QC REVIEW..... | 2 |
| A3.0 CONCLUSION | 7 |

LIST OF TABLES
(Following Report)

- | | |
|------------|---|
| TABLE A.1 | SAMPLE COLLECTION SUMMARY |
| TABLE A.2 | ANALYTICAL RESULTS SUMMARY |
| TABLE A.3 | ANALYTICAL METHODS, SAMPLE PRESERVATION, AND HOLDING TIME CRITERIA |
| TABLE A.4 | QUALIFIED SAMPLE RESULTS DUE TO OUTLYING CALIBRATION RESULTS |
| TABLE A.5 | QUALIFIED SAMPLE RESULTS DUE TO OUTLYING INTERNAL STANDARD RECOVERIES |
| TABLE A.6 | QUALIFIED SAMPLE RESULTS DUE TO OUTLYING SURROGATE RECOVERIES |
| TABLE A.7 | QUALIFIED SAMPLE RESULTS DUE TO ANALYTE CONCENTRATIONS IN THE METHOD BLANKS |
| TABLE A.8 | QUALIFIED SAMPLE RESULTS DUE TO OUTLYING MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERIES |
| TABLE A.9 | QUALIFIED SAMPLE RESULTS DUE TO OUTLYING SPIKE RECOVERIES |
| TABLE A.10 | QUALIFIED SAMPLE RESULTS DUE TO POOR LABORATORY DUPLICATE PRECISION |
| TABLE A.11 | QUALIFIED SAMPLE RESULTS DUE TO OUTLYING SERIAL DILUTIONS |
| TABLE A.12 | SAMPLES WITH PERCENT SOLIDS LESS THAN 50 PERCENT |
| TABLE A.13 | QUALIFIED SAMPLE RESULTS DUE TO FIELD DUPLICATE ANALYSES |

LIST OF ATTACHMENTS

ATTACHMENT A1 CHAIN OF CUSTODY FORMS

A1.0 INTRODUCTION

Samples of sediment were collected in support of the investigation of the embankment beneath the Port of Tacoma Industrial Yard Pier 25 adjacent to the former OCC Tacoma Facility in Tacoma, Washington. Sample collection was performed in January 1998. The samples were analyzed by Analytical Resources, Inc. (ARI) in Seattle, Washington. All samples were submitted for the analysis of selected volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), pesticides/PCBs, and metals.

Copies of the chain of custody forms are included in Attachment A1. A field collection summary is presented in Table A.1. A summary of the analytical results is presented in Table A.2.

Samples were analyzed in accordance with the methods referenced in Table A.3. Modifications to the sample preparation volumes and/or final concentrate volumes were made to provide detection limits that met or approached the sediment quality objective (SQO) criteria. The quality assurance/quality control (QA/QC) criteria by which these data have been assessed are outlined in the analytical methods and in the "Sampling and Analysis Plan, Embankment Beneath Pier 25, Port of Tacoma Industrial Yard, Inc., OCC Tacoma, Inc., Tacoma, Washington" (SAP). The Quality Assurance Project Plan (QAPP) is located in Appendix B of the SAP.

Additional validation guidance was referenced from the following documents:

- i) "USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review" EPA 5400/R-94/012, February 1994; and
- ii) "USEPA Contact Laboratory Program National Functional Guidelines for Inorganic Data Review", EPA-5400/R-94-013, February 1994.

The data were reported with the deliverables specified in the QAPP. All sample data, including the associated raw data, were assessed.

A2.0 QA/QC REVIEW

HOLDING TIMES

The holding time criteria specified in the QAPP are presented in Table A.3. All samples were extracted and analyzed within the recommended holding times.

All samples were properly preserved, transported, and stored at 4°C ($\pm 2^\circ\text{C}$) except for two coolers received at 7°C and 11°C. Since the samples were promptly delivered to the laboratory and stored at 4°C upon receipt, no qualification of the data was necessary.

INSTRUMENT CALIBRATION

Gas Chromatograph/Mass Spectrometer (GC/MS) - VOCs, SVOCs

The GC/MS instrumentation was properly tuned prior to sample analyses. All calibration data showed adequate instrument sensitivity.

All initial calibration curves showed acceptable linearity. Some SVOC continuing calibration standard results indicated slight variability in instrument response. Associated detected results were qualified as estimated based on the indicated variability (see Table A.4). Associated non-detect sample results were judged acceptable based on adequate instrument sensitivity.

Gas Chromatograph (GC) - Pesticides/PCBs

All initial and continuing calibration data for the GC analyses showed adequate instrument sensitivity. Most calibration results showed acceptable linearity.

Various initial and continuing calibration standard results did indicate slight variability in instrument response. Associated detected results were qualified as estimated based on the indicated variability (see Table A.4). All associated non-detect data were judged to be acceptable based on adequate instrument response for the calibration standards.

Metals - Inductively Coupled Plasma-Atomic Emission Spectrometer (ICP)

Calibration curves and initial calibration verification (ICV) and continuing calibration verification (CCV) standards were analyzed at the proper frequency.

The calibration curves were acceptable and all ICV and CCV recoveries associated with the samples were within the required control limits.

Interference check standards (ICSs) were analyzed at the proper frequency; all recoveries were acceptable. Some positive results were reported for the metals of interest in the ICS A solution, which should not contain these metals.

The investigative samples did not contain similar levels of the interfering elements, and no qualification of the data was necessary.

Graphite Furnace and Mercury - Atomic Absorption Spectrometer (AA)

All calibration curves met the acceptance criteria and all ICV and CCV recoveries associated with the samples were within the required control limits.

INTERNAL STANDARD RECOVERIES - GC/MS ANALYSES

The proper internal standard (IS) compounds were added to all samples, blanks, standards, and spike samples prior to VOC and SVOC analyses. All VOC IS recoveries associated with the sample results were acceptable. Several SVOC IS recoveries were outside of QC limits. When possible, sample results were used from sample dilutions with acceptable IS recoveries. All remaining SVOC sample results associated with outlying IS recoveries were qualified as estimated (see Table A.5).

SURROGATE COMPOUND ANALYSES - ORGANICS

Surrogate compounds were added to all samples, blanks, and QC samples prior to extraction and/or analysis. Some surrogate spikes could not be assessed due to necessary dilutions of the sample extract.

All SVOC surrogate recoveries met the acceptance criteria. Several pesticide/PCB surrogate recoveries could not be assessed due to chromatographic interferences. In instances where both pesticide/PCB surrogates (TCMX and DCB) could not be assessed, all associated positive results were qualified as estimated due to the potential high bias. If only the DCB surrogate was interfered with, only the associated positive PCB results were qualified as estimated.

All sample data qualified based on surrogate recoveries are summarized in Table A.6.

METHOD BLANK ANALYSES

Method blanks were analyzed and/or extracted at the proper frequency for all parameters.

Bis(2-ethylhexyl)phthalate and various metals were detected in the blanks. All associated sample results with analyte concentrations similar to those present in the method blanks were qualified as non-detect (see Table A.7).

MATRIX SPIKE/MATRIX SPIKE DUPLICATE ANALYSES

Matrix spikes (MS) were prepared and analyzed (in duplicate for organics) as specified in Table A.1.

In some cases, no metals or pesticide/PCB spike recoveries were available for assessment due to elevated concentrations of the spiked analyte in the sample.

Most spike recoveries showed acceptable analytical accuracy and precision. Results associated with outlying recoveries were qualified as follows:

- i) Several MS/MSD analyses resulted in only one outlying recovery. If the RPD for the analysis was acceptable, the associated data were judged acceptable without qualification based on the acceptable recovery of the companion spike.
- ii) Some MS/MSD analyses resulted in outlying RPDs. Associated positive results were qualified as estimated to reflect the indicated variability (see Table A.8). Associated non-detect results were not impacted by the variability.
- iii) Some analyses resulted in high MS recoveries. Associated positive results were qualified as estimated based on the indicated high bias (see Tables A.8 and A.9). Non-detect results were not impacted.
- iv) Some analyses resulted in low MS recoveries. Associated positive sample results were qualified as estimated based on the indicated low bias (see Tables A.8 and A.9). Non-detect results were judged acceptable based on sufficient analyte recovery.
- v) Several high lead MS recoveries were reported for the samples collected on January 20, 1998. All associated sample results were qualified as estimated to reflect the high bias.

- vi) Several high pyrene recoveries and/or RPDs were reported for the samples collected on January 20, 1998. All associated sample results were qualified as estimated to reflect the high bias and/or variability.
- vii) Several extremely low antimony recoveries were reported for the samples collected on January 20, 1998. All associated positive results were qualified as estimated to reflect the indicated low bias. All associated non-detect antimony results for samples collected on this date were rejected in Table A.2 based on the poor recoveries.

LABORATORY CONTROL SAMPLE (LCS) ANALYSES

LCS samples were prepared and analyzed with each batch of samples. All LCS analyses were acceptable, demonstrating good analytical accuracy.

DUPLICATE ANALYSES

Duplicate samples were prepared for the metals analyses and analyzed as specified in Table 1.

Most duplicate analyses were acceptable. Some duplicate analyses indicated that variability existed outside of the estimated regions of detection. All associated sample results were qualified as estimated (see Table A.10).

GRAPHITE FURNACE QA/QC

Graphite furnace analyses require duplicate injections and post-digestion spikes for all samples. All graphite furnace QA/QC samples were performed as required, and all results met the acceptance criteria.

ICP SERIAL DILUTION

The samples submitted for MS analyses were also analyzed as serial dilution samples. Most analyses met the acceptance criteria. Results associated with outlying serial dilution analyses were qualified as estimated (see Table A.11).

SAMPLE QUANTITATION

Several of the samples collected on January 20, 1998 had percent solids values of less than 50 percent. A summary of the affected samples is presented in Table A.12. Since the amount of moisture present can introduce analytical variability, all associated detected sample results for these samples were qualified as estimated in Table A.2.

Several of the samples collected on January 20, 1998 exhibited considerable matrix interferences for the pesticide/PCB analyses. Several detection limits for the single component pesticides were elevated in Table A.2 based on the chromatographic interferences.

FIELD QA/QC

Field Duplicate Analyses

Three samples were collected in duplicate and submitted to the laboratory for analysis. Most results outside of estimated regions of detection showed acceptable analytical and sampling precision except for polynuclear aromatic hydrocarbon results, which exhibited variability in all three field duplicates. Positive sample results associated with field duplicate analyses which did indicate variability were qualified as estimated (see Table A.13).

The field duplicate results for location 3A (0-0.3) were not further assessed, since all positive sample results were previously qualified for low percent solids.

Trip Blank Analyses

Two trip blank samples were submitted to the laboratory and analyzed for the VOCs of interest. All trip blank results were non-detect.

Rinse Blank Analyses

Three rinse blanks were collected and submitted to the laboratory for analysis. All results were non-detect except for antimony, which was detected in one of the blanks collected on January 20, 1998. All associated sample results were either previously qualified as non-detect due to method blanks or were significantly higher than the antimony present in the blank. No qualification of the data was necessary.

A3.0 CONCLUSION

Based on the preceding assessment of the analytical data provided, these results are acceptable for their intended use with the qualifications and exceptions noted.

APPENDIX A - TABLES

TAB₀₀₀A1
SAMPLE COLLECTION SUMMARY
EMBANKMENT BENEATH PIER 25
PORT OF TACOMA INDUSTRIAL YARD
TACOMA, WASHINGTON

| Date | Location ID | Interval (Ft. BGS) | Matrix | Description | Sample No. | Sample Depth (Ft. BGS) | Analyses | Laboratory |
|----------|-------------|--------------------|----------|--|--|---|--|--------------------------|
| 01/09/98 | 1 | 0 to 0.5 | Sediment | SM - SAND, silt | PT-010998-CFD-002 | 0 to 0.5 (MS/MSD) | Pier 25 Parameters ⁽¹⁾ | ARI |
| 01/21/98 | 1A | 0 to 1.5 | Sediment | SP - SAND, trace silt, loose, very wet, chemical-like odor, sheen | SE-012198-JOS-33 SE-012198-JOS-34 SE-012198-JOS-35 | 0 to 0.3 0 to 1.5 1.5 to 3.0 (MS/MSD - VOCs) | Pier 25 Parameters Pier 25 Parameters Pier 25 Parameters | ARI ARI ARI |
| | | 1.5 to 3.0 | Sediment | ML - SILT, soft, very fine, poorly graded, gray/light brown, sweet chemical-like odor, wet | | | | |
| 01/09/98 | 2 | 0 to 0.5 | Sediment | SW/GW - SAND/GRAVEL, silt | PT-010998-CFD-011 | 0 to 0.5 | Pier 25 Parameters | ARI |
| 01/09/98 | 3 | 0 to 0.33 | Sediment | SM/ML - SAND, SILT | PT-010998-CFD-008 PT-010998-CFD-009 | 0 to 0.33 0 to 0.33 (Dup) | Pier 25 Parameters Pier 25 Parameters | ARI ARI |
| 01/21/98 | 3A | 0 to 0.4 | Sediment | SM/ML - SAND, SILT, loose, fine, poorly graded, brown/gray, wet slag, shell, wood, sheen graded, black, wet, shell, slag, wood | SE-012198-JOS-26 SE-012198-JOS-27 SE-012198-JOS-28 SE-012198-JOS-29 | 0 to 0.3 0 to 0.3 (Dup) 0 to 1.5 (MS/MSD) 1.5 to 3.0 | Pier 25 Parameters Pier 25 Parameters Pier 25 Parameters Pier 25 Parameters | ARI ARI ARI ARI |
| | | 1.5 to 3.0 | Sediment | SP - SAND, trace gravel, loose, fine-medium grained, poorly graded, black, wet | | | | |
| 01/21/98 | 3B | 0 to 0.5 | Sediment | SM - SAND, SILT, trace gravel, loose, fine grained, poorly graded, brown/gray, wet, wood, shell | SE-012198-JOS-30 SE-012198-JOS-31 SE-012198-JOS-32 | 0 to 0.3 0 to 1.5 (MS/MSD) 1.5 to 3.0 | Pier 25 Parameters Pier 25 Parameters Pier 25 Parameters | ARI ARI ARI |
| 01/09/98 | 5 | 0 to 0.42 | Sediment | ML/SM - SILT/SAND, shell | PT-010998-CFD-004 | 0 to 0.42 | Pier 25 Parameters | ARI |

TAB₀₀-A1
SAMPLE COLLECTION SUMMARY
EMBANKMENT BENEATH PIER 25
PORT OF TACOMA MAIN INDUSTRIAL YARD
TACOMA, WASHINGTON

| Date | Location ID | Interval (Ft. BGS) | Matrix | Description | Sample No. | Sample Depth (Ft. BGS) | Analyses | Laboratory |
|----------|-------------|--------------------|----------|---|--|---|--|-------------------|
| 01/20/98 | 5A | 0 to 0.5 | Sediment | SM/ML - SAND, SILT, trace gravel, loose, fine-medium grained, poorly graded, gray/brown, wet, shell/sheen | SE-012098-JOS-20 SE-012098-JOS-21 SE-012098-JOS-22 | 0 to 0.3 0 to 1.0 1.0 to 3.0 | Pier 25 Parameters Pier 25 Parameters Pier 25 Parameters | ARI ARI ARI |
| | | 0.5 to 1.0 | Sediment | as above, sweet chemical-like odor, sheen | | | | |
| | | 1.0 to 3.0 | Sediment | soft sludge-like, gray/green/white, strong sulfur-like odor, wet, bentonite-like | | | | |
| 01/20/98 | 5B | 0 to 0.5 | Sediment | SM/ML - SAND, SILT, loose, very fine, poorly graded, brown/gray, wet | SE-012098-JOS-23 SE-012098-JOS-24 SE-012098-JOS-25 | 0 to 0.3 0 to 1.5 1.5 to 3.0 (MS/MSD) | Pier 25 Parameters Pier 25 Parameters Pier 25 Parameters | ARI ARI ARI |
| | | 0.5 to 3.0 | Sediment | ML - SILT, trace gravel, soft, very fine, poorly graded, black, wet, bivalve shells, chemical odor | | | | |
| 01/09/98 | 6 | 0 to 0.3 | Sediment | SM/ML - SAND/SILT, clay, brick | PT-010998-CFD-014 | 0 to 1.33 | Pier 25 Parameters | ARI |
| 01/09/98 | 7 | 0 to 0.3 | Sediment | SM - SAND, shell | PT-010998-CFD-005 | 0 to 0.33 | Pier 25 Parameters | ARI |
| 01/20/98 | 7A | 0 to 0.7 | Sediment | SM/ML - SAND, SILT, loose, fire grained, poorly graded, brown/gray, wet, shell | SE-012098-JOS-13 SE-012098-JOS-14 SE-012098-JOS-15 | 0 to 0.3 0 to 1.5 1.5 to 3.0 | Pier 25 Parameters Pier 25 Parameters Pier 25 Parameters | ARI ARI ARI |
| | | 0.7 to 3.0 | Sediment | ML - SILT, trace sand, soft, very fine, poorly graded, black, wet, sheen | SE-012098-JOS-16 | 1.5 to 3.0 (Dup) | Pier 25 Parameters | ARI |
| 01/20/98 | 7B | 0 to 0.3 | Sediment | SM/ML - SAND, SILT, loose, fire grained, poorly graded, brown/gray, wet | SE-012098-JOS-17 SE-012098-JOS-18 SE-012098-JOS-19 | 0 to 0.3 0 to 1.5 1.5 to 3.0 | Pier 25 Parameters Pier 25 Parameters Pier 25 Parameters | ARI ARI ARI |
| | | 0.3 to 3.0 | Sediment | ML - SILT, soft, very fine, poorly graded, black, wet, sheen | | | | |
| 01/09/98 | 8 | 0 to 0.3 | Sediment | GW/SM - GRAVEL/SAND, silt | PT-010998-CFD-006 | 0 to 1.33 | Pier 25 Parameters | ARI |
| 01/09/98 | 9 | 0 to 0.3 | Sediment | SM - SAND, silt | PT-010998-CFD-007 | 0 to 1.33 | Pier 25 Parameters | ARI |

TABLE A.1
SAMPLE COLLECTION SUMMARY
EMBANKMENT BENEATH PIER 25
PORT OF TACOMA INDUSTRIAL YARD
TACOMA, WASHINGTON

| Date | Location ID | Interval (Ft. BGS) | Matrix | Description | Sample No. | Sample Depth (Ft. EGS) | Analyses | Laboratory |
|----------|-------------|--------------------|----------|--|-------------------|------------------------|--------------------|------------|
| 01/20/98 | 9A | 0 to 0.3 | Sediment | SM/ML - SAND, SILT, loose, fine grained, brown/gray, wet | SE-0120%JOS-10 | 0 to 0.3 | Pier 25 Parameters | ARI |
| | | 0.3 to 3.C | Sediment | ML - SILT, trace gravel, soft, very fine, poorly graded, black, wet, bivalve shells | SE-0120%JOS-11 | 0 to 1.5 | Pier 25 Parameters | ARI |
| | | 0 to 0.4 | Sediment | ML - SILT, trace sand, very soft, wet, sheen, wood, shell, metal | SE-0120%JOS-12 | 1.5 to 3.0 | Pier 25 Parameters | ARI |
| 01/20/98 | 9B | 0.4 to 3.C | Sediment | black, no debris | SE-0120%JOS-07 | 0 to 0.3 | Pier 25 Parameters | ARI |
| | | 0 to 0.33 | Sediment | ML - SILT, clay, gravel | SE-0120%JOS-08 | 0 to 1.5 | Pier 25 Parameters | ARI |
| | | 0.5 to 3.C | Sediment | GW/SM - GRAVEL, SAND, silt | SE-0120%JOS-09 | 1.5 to 3.0 | Pier 25 Parameters | ARI |
| 01/09/98 | 10 | 0 to 0.33 | Sediment | ML - SILT, trace gravel, soft, very wet, bivalve shells | PT-010998-CFD-012 | 0 to 0.33 | Pier 25 Parameters | ARI |
| 01/09/98 | 11 | 0 to 0.33 | Sediment | ML - SILT, very soft, very fine, poorly graded, black, wet | PT-010998-CFD-010 | 0 to 0.33 | Pier 25 Parameters | ARI |
| 01/20/98 | 11A | 0 to 0.5 | Sediment | ML - SILT, trace gravel, soft, very wet, bivalve shells | SE-0120%JOS-01 | 0 to 0.3 | Pier 25 Parameters | ARI |
| 01/20/98 | 11B | 0.5 to 3.C | Sediment | ML - SILT, very soft, very fine, poorly graded, black, wet | SE-0120%JOS-02 | 0 to 1.5 | Pier 25 Parameters | ARI |
| | | 0 to 0.5 | Sediment | ML - SILT, trace gravel, soft, very fine, poorly graded, light gray, wet, wood, bivalve shells,sheen | SE-0120%JOS-03 | 1.5 to 3.0 | Pier 25 Parameters | ARI |
| | | 0.5 to 3.C | Sediment | ML - SILT, very soft, very fine, poorly graded, black, wet | SE-0120%JOS-04 | 0 to 0.3 | Pier 25 Parameters | ARI |
| 01/09/98 | 12 | 0 to 0.33 | Sediment | SM - SAND, gravel | SE-0120%JOS-05 | 0 to 1.5 | Pier 25 Parameters | ARI |
| | | 0 to 0.33 | Sediment | ML - SILT, very soft, very fine, poorly graded, black, wet | SE-0120%JOS-06 | 1.5 to 3.0 | Pier 25 Parameters | ARI |
| 01/09/98 | 12 | 0 to 0.33 | Sediment | PT-010998-CFD-013 | 0 to 0.33 | Pier 25 Parameters | ARI | |

TABLE A.1
SAMPLE COLLECTION SUMMARY
EMBANKMENT BENEATH PIER 25
PORT OF TACOMA INDUSTRIAL YARD
TACOMA, WASHINGTON

| Date | Location ID | Interval (Ft. BGS) | Matrix | Description | Sample No. | Sample Depth (Ft. EGS) | Analyses | Laboratory |
|----------|-------------|-----------------------|-------------|-----------------------------------|------------------|---------------------------|--------------------|------------|
| 01/09/98 | - | | Rinse Water | Rinse Blank | PT-010998-JS-001 | to | Pier 25 Parameters | ARI |
| 01/20/98 | - | to | Rinse Water | Rinsate blank of Shelby tube | W-012098-JOS-01 | to | Pier 25 Parameters | ARI |
| 01/21/98 | - | to | Rinse Water | Rinsate blank of Van Veen Sampler | W-012198-JOS-02 | to | Pier 25 Parameters | ARI |

Notes:

- (1) Listed in Table 4.1 of the Sampling and Analysis Plan.
- Dup Duplicate.
- Ft. BG Feet Below Ground Surface.
- MS Matrix Spike.
- MSD Matrix Spike Duplicate.

Analytical Data
Embankment Beneath Pier 25
Port of Tacoma Industrial Yard
Tacoma, Washington

| Sample Location: | | I | IA | 1A | 1A | 1A | 1A | 2 | 3 | 3 | 3A |
|---------------------------------|-------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|------------------|----|
| Sample Depth: | | -- | 0-0.3 ft. | 0-1.5 ft. | 1.5-3.0 ft. | -- | -- | -- | -- | 0-0.3 ft. | |
| Sample Id: | | PT-010998-CFD-002 | SE-0120-98-JOS-33 | SE-0120-98-JOS-34 | SE-0120-98-JOS-35 | PT-010998-CFD-011 | PT-010998-CFD-013 | PT-010998-CFD-009 | PT-010998-CFD-009 | SE-0120-98-OS-26 | |
| Sample Date: | | 01/09/98 | 01/21/98 | 01/21/98 | 01/21/98 | 01/05/98 | 01/05/98 | 01/09/98 | 01/09/98 | 01/21/98 | |
| Parameters | Units | | | | | | | | | Dupl. | |
| Acid Extractables | | | | | | | | | | | |
| 1,4-Dimethylphenol | ug/kg | ND 19 | ND 39 | 810 J | 2100 J | ND 19 | ND 19 | ND 19 | ND 19 | ND 39 | |
| Methylphenol | ug/kg | ND 19 | ND 39 | 200 J | 650 J | ND 19 | ND 19 | ND 19 | ND 19 | ND 39 | |
| 2-Methylphenol | ug/kg | ND 19 | ND 39 | ND 810 | ND 2000 | 74 | ND 19 | ND 19 | ND 19 | 40 | |
| Pentachlorophenol | ug/kg | ND 97 | ND 200 | ND 440 | ND 420 | ND 95 | ND 95 | ND 94 | ND 94 | NE 190 | |
| Phenol | ug/kg | ND 19 | 240 J | 100 J | 310 J | ND 19 | ND 19 | ND 19 | ND 19 | 65 | |
| Semi-volatile Organics | | | | | | | | | | | |
| 1,2,4-Trichlorobenzene | ug/kg | ND 19 | ND 39 | 130 J | 180 J | ND 19 | ND 19 | ND 19 | ND 19 | ND 39 | |
| 1,2-Dichlorobenzene | ug/kg | ND 19 | ND 39 | ND 88 | ND 85 | ND 19 | ND 19 | ND 19 | ND 19 | ND 39 | |
| 1,3-Dichlorobenzene | ug/kg | ND 19 | ND 39 | ND 88 | ND 85 | ND 19 | ND 19 | ND 19 | ND 19 | ND 39 | |
| 1,4-Dichlorobenzene | ug/kg | 42 | ND 39 | 1800 J | 3500 J | 22 | 77 | 120 | 200 | J | |
| 2-Methylnaphthalene | ug/kg | 48 | 510 J | 1700 J | 2000 J | 3200 J | ND 19 | 150 J | 340 J | J | |
| Naphthalene | ug/kg | 81 | 1700 J | 1700 J | 160 J | 95 J | ND 85 | 1100 J | 190 J | J | |
| Acenaphthylene | ug/kg | 39 | 160 J | 160 J | 150 J | 5300 J | 230 | 1000 J | 15000 J | J | |
| Anthracene | ug/kg | 420 | 160 J | 2200 J | 3200 J | 2900 J | 430 | 2400 J | 12000 J | J | |
| benzo(a)Anthracene | ug/kg | 1000 | 1600 J | 1600 J | 1600 J | 1200 J | 570 | 2700 J | 37000 J | J | |
| benzo(a)Pyrene | ug/kg | 960 | 1200 J | 2400 J | 2600 J | 1400 J | 610 | 3200 J | 31000 J | J | |
| benzo(b)Fluoranthene | ug/kg | 1200 | 1200 J | 1200 J | 1200 J | 1200 J | 610 J | 240 J | 7600 J | J | |
| benzo(g,h,i)Perylene | ug/kg | 530 | 540 J | 1200 J | 1200 J | 1500 J | 560 | 2400 J | 800 J | J | |
| benzo(k)Fluoranthene | ug/kg | 880 | 700 J | 820 J | 820 J | 490 J | 260 | 770 | 7500 J | J | |
| bis(2-ethylhexyl)Phthalate | ug/kg | ND 190 | ND 39 | ND 88 | ND 85 | ND 85 | 49 | 76 J | 740 J | J | |
| Butylbenzylphthalate | ug/kg | 25 | 2400 J | 3600 J | 3000 J | 800 | 3400 J | 14000 J | 49 J | ND 39 J | |
| Chrysene | ug/kg | 1300 | ND 19 | 45 J | ND 88 | 130 J | 50 | 45 | 50 | 600 J | |
| di-N-Butylphthalate | ug/kg | ND 19 | ND 39 | ND 88 | ND 85 | ND 19 | ND 19 | ND 190 | ND 940 | ND 39 J | |
| dibenz(a,h)Anthracene | ug/kg | 230 | 300 J | 290 J | 160 J | 170 | 740 J | 1700 J | 670 J | 670 J | |
| Dibenzofuran | ug/kg | 78 | 1300 J | 1600 J | 2900 J | ND 19 | 150 J | 570 J | 310 J | 310 J | |
| Diethylphthalate | ug/kg | ND 19 | ND 39 | ND 88 | ND 85 | ND 19 | ND 19 | ND 19 | ND 19 | ND 39 J | |
| Dimethylphthalate | ug/kg | ND 19 | ND 39 | ND 88 | ND 85 | 45 | 54 | 53 | 53 | 99 J | |
| Fluoranthene | ug/kg | 3300 | 10000 J | 16000 J | 18000 J | 18000 J | 5800 J | 6000 J | 8900 J | J | |
| Fluorene | ug/kg | 100 | 1100 J | 2200 J | 5200 J | 5200 J | 36 | 310 J | 2000 J | 550 J | |
| Hexachlorobenzene | ug/kg | 46 | 380 J | 5600 J | 5100 J | 5100 J | 22 | 110 J | 200 J | 45 J | |
| Hexachlorobuadiene | ug/kg | ND 19 | 2100 J | 28000 J | 72000 J | 72000 J | 18 J | 64 J | 64 J | 46 J | |
| Hexachloroetane | ug/kg | 31 | 44 J | ND 88 | ND 85 | ND 19 | ND 19 | ND 19 | ND 19 | ND 19 | |
| Indeno[1,2,3- <i>h</i>]Pyrrole | ug/kg | 620 | 1000 J | 840 J | 440 J | 440 J | 460 | 1800 J | 4200 J | 1400 J | |

Table A.2

Analytical Data
Embankment Beneath Pier 25
Port of Tacoma Industrial Yard
Tacoma, Washington

| Sample Location: | 1 | 1A | 1A | 1A | 1.5-3.0 ft. | 2 | 3 | 3 | 3A |
|--|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|
| Sample Depth: | - | 0-0.3 ft. | 0-1.5 ft. | - | - | - | - | - | 0-0.3 ft. |
| Sample Id: | SE-0120 98-JOS-33 | SE-0130 98-JOS-34 | SE-0110 98-JOS-35 | PT-010998-CFD-011 | PT-010998-CFD-008 | PT-010998-CFD-009 | PT-010998-CFD-009 | PT-010998-CFD-009 | SE-0120 98-JDS-26 |
| Sample Date: | 01/09/98 | 01/21/98 | 01/21/98 | 01/09/98 | 01/09/98 | 01/09/98 | 01/09/98 | 01/09/98 | 01/21/98 |
| Parameters | Dupl. | | | | | | | | |
| <u>Semi-volatile Organics (Cont'd)</u> | | | | | | | | | |
| N-Nitrosodiphenylamine | ND 19 | ND 270 | ND 1800 | ND 4600 | ND 19 | ND 19 | ND 19 | ND 39 | ND 39 |
| Naphthalene | 130 | 700 J | 16000 J | 43000 J | ND 19 | 58 J | 120 J | 500 J | 500 J |
| Furananthrene | 580 | 6700 J | 12000 J | 25000 J | 3100 J | 20000 J | 18000 J | 18000 J | 18000 J |
| Fyrene | 2400 | 2400 J | 5500 J | 5400 J | 790 J | 350000 J | 4100 J | 6400 J | 6400 J |
| <u>Metals</u> | | | | | | | | | |
| Antimony | 3.6 J | 2.2 J | 2.7 J | ND 0.7 | 9 J | 16 J | 12 J | 1.3 J | 1.3 J |
| Arsenic | 30 J | 27 J | 52 J | 45 J | 58 J | 100 J | 140 J | 22 J | 22 J |
| Cadmium | 0.36 J | 0.5 J | 0.95 J | 0.6 J | 0.5 J | 1.4 J | 1.5 J | 0.8 J | 0.8 J |
| Chromium | 55 | 41 J | 66 J | 24 J | 84 | 220 | 220 | 83 | 83 |
| Copper | 590 J | 150 J | 85 J | 32 J | 400 J | 1100 J | 1000 J | 240 J | 240 J |
| Lead | 200 | 120 J | 110 J | 22 J | 280 | 3300 J | 1200 J | 160 J | 160 J |
| Mercury | 0.20 | 0.20 J | 0.27 J | 0.09 J | 0.46 | 0.81 | 0.68 | 0.38 J | 0.38 J |
| Nickel | 25 | 26 J | 64 J | 42 J | 75 | 92 | 75 | 27 J | 27 J |
| Silver | 0.14 | 0.22 J | 0.20 J | ND 0.06 | 0.19 | 1.3 | 1.3 | 0.59 J | 0.59 J |
| Zinc | 1600 J | 740 J | 320 J | 36 J | 900 J | 1400 J | 1700 J | 270 J | 270 J |
| <u>Pesticides/PCBs</u> | | | | | | | | | |
| 4,4'-DDD | ND 6 | ND 20 | ND 69 | ND 53 | ND 19 | ND 25 | ND 27 | ND 8.3 | ND 8.3 |
| 4,4'-DDE | ND 1.9 | ND 25 | ND 360 | ND 310 | ND 47 | ND 11 | ND 13 | ND 4.3 | ND 4.3 |
| 4,4'-DDT | ND 6.8 | ND 20 | ND 55 | ND 53 | ND 18 | ND 46 | ND 41 | ND 15 | ND 15 |
| Aldrin | ND 0.97 | ND 38 | ND 28 | ND 26 | ND 0.95 | ND 0.94 | ND 0.94 | ND 0.97 | ND 0.97 |
| alpha-Chlordane | ND 0.97 | ND 9.8 | ND 28 | ND 26 | ND 0.95 | ND 0.94 | ND 0.94 | ND 22 | ND 22 |
| Aroclor 016 | ND 19 | ND 200 | ND 550 | ND 530 | ND 95 | ND 94 | ND 94 | ND 19 | ND 19 |
| Aroclor 1221 | ND 39 | ND 390 | ND 1100 | ND 1100 | ND 190 | ND 190 | ND 190 | ND 39 | ND 39 |
| Aroclor 1232 | ND 19 | ND 200 | ND 550 | ND 530 | ND 95 | ND 94 | ND 94 | ND 19 | ND 19 |
| Aroclor 1242 | ND 19 | ND 200 | ND 550 | ND 530 | ND 140 | ND 94 | ND 94 | ND 19 | ND 19 |
| Aroclor 1248 | ND 19 | ND 200 | ND 550 | ND 530 | ND 400 | ND 94 | ND 94 | ND 19 | ND 19 |
| Aroclor 1254 | ND 19 | 120 J | 240 J | ND 550 | ND 530 | 470 J | 840 J | 180 J | 180 J |
| Aroclor 1260 | ND 1.9 | ND 20 | ND 55 | ND 53 | ND 66 | ND 11 | ND 13 | ND 1.9 | ND 1.9 |
| Dieldrin | ND 2.1 | ND 9.8 | ND 28 | ND 26 | ND 49 | ND 9.7 | ND 5.0 | ND 2.1 | ND 2.1 |
| gamma-BHC (Lindane) | ND 5.2 | ND 9.8 | ND 28 | ND 26 | ND 14 | ND 18 | ND 19 | ND 15 | ND 15 |
| gamma-Chlordane | ND 2.1 | ND 16 | ND 180 | ND 240 | ND 240 | ND 5.5 | ND 4.5 | ND 2.3 | ND 2.3 |
| Heptachlor | ug/kg | | | | | | | | |

05/21/98

Table A.2

Analytical Data
Embankment Beneath Pier 25
Port of Tacoma Industrial Yard
Tacoma, Washington

Page 1 (c)
Date Printed: May 27, 1998
Time Printed: 10:26 am

| <u>Sample Location:</u> | 1 | 1A | 1A | 1A | 2 | 3 | 3 | 3A |
|--------------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|
| <u>Sample Depth:</u> | - | 0-0.1 ft. | 0-1.5 ft. | 1.5-3.0 ft. | -- | -- | -- | 0-0.3 ft. |
| <u>Sample Id#:</u> | PT-010998-CFD-002 | SE-0120 98-JOS-33 | SE-0120 98-JOS-34 | SE-0120 98-JOS-35 | PT-010998-CFD-011 | PT-010998-CFD-008 | PT-010998-CFD-009 | SE-0120 98-JOS-26 |
| <u>Sample Date:</u> | 01/09/98 | 01/21/98 | 01/21/98 | 01/21/98 | 01/09/98 | 01/09/98 | 01/09/98 | 01/21/98 |
| <u>Parameters</u> | Dupl. | | | | | | | |
| <u>Units</u> | | | | | | | | |
| <u>Volatile Organics</u> | | | | | | | | |
| Ethylbenzene | ND 1.0 | ND 3.6 | 6.1 J | 280 J | ND 1.0 | ND 1.0 | ND 2.2 | ND 1.9 |
| n,p-Xylene | ND 1.9 | ND 7.2 | 8.6 J | 400 J | ND 2.0 | ND 1.9 | ND 4.3 | ND 3.8 |
| o-Xylene | ND 1.0 | ND 3.6 | 4.2 J | 170 J | ND 1.0 | ND 1.0 | ND 2.2 | ND 1.9 |
| Tetrachloroethene | ND 1.0 | 140 J | 3700 J | 36000 J | 2.8 J | 0.8 J | 2.3 | ND 1.9 |
| Trichloroethene | ND 1.0 | 66 J | 55 J | 690 J | ND 1.0 | 0.9 J | 3.4 | 1.9 J |

Table A.2

Analytical Data
Embankment Beneath Pier 25
Port of Tacoma Industrial Yard
Tacoma, Washington

Page 2 (a)

Date Printed: May 27, 1998

Time Printed: 10:26 am

| <u>Parameters</u> | <u>Units</u> | 3A | 3A | 3A | 3B | 3B | 3B | 3B | 5 | 5A |
|-------------------------------|--------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|--------------------|-------------------|
| | | 0-0.3 ft. | 0-1.5 ft. | 1.5-3.0 ft. | <0.3 ft. | 0-1.5 ft. | 0-1.5-3.0 ft. | SE-0120 98-JOS-30 | SE-0120 98-JOS-31 | SE-0120 98-JOS-32 |
| <u>Sample Location:</u> | | SE-0120 98-JOS-27 | SE-0120 98-JOS-28 | SE-0120 98-JOS-29 | SE-0120 98-JOS-30 | SE-0120 98-JOS-31 | SE-0120 98-JOS-32 | PT-010998-CFD-004 | SE-0120 98-JDS-004 | 01/20/98 |
| <u>Sample Depth:</u> | | 01/21/98 | 01/21/98 | 01/21/98 | 01/21/98 | 01/21/98 | 01/21/98 | 01/09/98 | 01/20/98 | 01/20/98 |
| <u>Sample ID:</u> | | | | | | | | | | |
| <u>Sample Date:</u> | | | | | | | | | | |
| <u>Dupl.</u> | | | | | | | | | | |
| <u>Acid Extractables</u> | | | | | | | | | | |
| 2,4-Dimethylphenol | ug/kg | 53 J | ND 40 | 48 | ND 39 | 340 J | 310 J | ND 19 | ND 39 | ND 39 |
| 2-Methylphenol | ug/kg | ND 39 | ND 40 | ND 38 | ND 39 | 57 J | ND 54 | ND 19 | ND 39 | ND 39 |
| 4-Methylphenol | ug/kg | ND 39 | ND 40 | 82 | ND 39 | 120 J | 96 J | ND 19 | ND 39 | ND 39 |
| Fenachlorophenol | ug/kg | ND 190 | ND 200 | ND 190 | ND 190 | ND 250 | ND 270 | ND 95 | ND 200 | ND 200 |
| Phenol | ug/kg | ND 39 | ND 40 | 59 | ND 39 | ND 50 | ND 54 | ND 19 | 58 J | 58 J |
| <u>Semi-volatile Organics</u> | | | | | | | | | | |
| 1,2,4-Trichlorobenzene | ug/kg | ND 39 | ND 40 | ND 38 | ND 39 | 380 J | 380 J | ND 19 | ND 39 | ND 39 |
| 1,2-Dichlorobenzene | ug/kg | ND 39 | ND 40 | ND 38 | ND 39 | 56 J | ND 54 | ND 19 | ND 39 | ND 39 |
| 1,3-Dichlorobenzene | ug/kg | ND 39 | ND 40 | ND 38 | ND 39 | ND 50 | ND 54 | ND 19 | ND 39 | ND 39 |
| 1,4-Dichlorobenzene | ug/kg | 180 J | 210 | 250 | 45 J | 750 J | 810 J | 30 | 470 J | 470 J |
| 2-Methylnaphthalene | ug/kg | 630 J | 360 | 510 | 120 J | 100 J | 990 J | 990 J | 380 J | 380 J |
| Acenaphthene | ug/kg | 150 J | 66 | 78 | 100 J | 150 J | 75 J | 75 J | 68 | 160 J |
| Acenaphthylene | ug/kg | 1500 J | 700 | 880 | 720 J | 600 J | 660 J | 660 J | 340 J | 1400 J |
| Anthracene | ug/kg | 2400 J | 1600 J | 2200 | 2100 J | 1600 J | 1900 J | 1900 J | 580 J | 2000 J |
| benzo(a)Anthracene | ug/kg | 3000 J | 2600 | 3600 | 1900 J | 1400 J | 1200 J | 1200 J | 810 J | 2100 J |
| benzo(a)Perylene | ug/kg | 3700 J | 2500 | 4600 | 2200 | 1500 J | 1100 J | 1100 J | 1100 J | 3100 J |
| benzo(b)Fluoranthene | ug/kg | 950 J | 1000 | 1400 | 620 J | 600 J | 410 J | 440 J | 410 J | 410 J |
| benzo(g,h,i)Perylene | ug/kg | 3400 J | 3000 J | 3200 | 1900 J | 1400 J | 1400 J | 1400 J | 620 J | 1200 J |
| benzo(k)Fluoranthene | ug/kg | 1100 J | 1300 J | 12400 | 700 J | 1200 J | 1200 J | 1200 J | 340 J | 750 J |
| bis(2-ethylhexyl)Phthalate | ug/kg | ND 39 | 87 | ND 38 | ND 39 | ND 50 | ND 54 | ND 54 | 160 J | ND 39 |
| benzylbenzyl phthalate | ug/kg | 3100 J | 2300 J | 4300 | 2700 J | 1700 J | 2100 J | 2100 J | 1100 J | 2700 J |
| Chrysene | ug/kg | 41 J | 84 | 49 | ND 39 | ND 50 | ND 54 | ND 54 | ND 19 | ND 39 |
| di-N-Butylphthalate | ug/kg | ND 39 | ND 40 | ND 38 | ND 39 | 160 J | ND 54 | ND 19 | ND 39 | ND 39 |
| di-N-Octyl phthalate | ug/kg | 560 J | 700 | 660 | 540 J | 280 J | 220 J | 220 J | 220 J | 220 J |
| dibenz(a,h)Anthracene | ug/kg | 280 J | 280 | 400 | 110 J | 700 J | 680 J | 40 | 220 J | 220 J |
| Dibenzo furan | ug/kg | ND 39 | ND 40 | ND 38 | ND 39 | ND 50 | ND 54 | ND 19 | ND 39 | ND 39 |
| Diethyl phthalate | ug/kg | 65 J | ND 40 | ND 38 | ND 39 | ND 50 | ND 54 | 150 | 50 J | 50 J |
| Dimethyl phthalate | ug/kg | 7500 J | 2200 | 2400 | 9100 J | 3300 J | 3300 J | 930 | 540 J | 540 J |
| Fluoranthene | ug/kg | 470 J | 360 | 410 | 200 J | 970 J | 970 J | 84 | 84 | 84 |
| Fluorene | ug/kg | ND 39 | 60 | 77 | ND 39 | 430 J | 430 J | ND 19 | ND 19 | ND 19 |
| Hexachlorobenzene | ug/kg | ND 39 | 53 | 63 | ND 39 | 100 J | 85 J | ND 19 | ND 19 | ND 19 |
| Hexachlorobutadiene | ug/kg | ND 39 | ND 40 | ND 38 | ND 39 | ND 50 | ND 54 | ND 50 | 2300 J | 2300 J |
| Hexachloroocetane | ug/kg | 1300 J | 1400 | 1900 | 850 J | 680 J | 510 J | 510 J | 560 J | 560 J |

Table A.2

Analytical Data
Embankment Beneath Pier 25
Port of Tacoma Industrial Yard
Tacoma, Washington

| Sample Location: | 3A | 3A | 3A | 3B | 3B | 3B | 3B | 5 | 5A |
|--|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|------------------|-------------------|
| Sample Depth: | 0-0.3 ft. | 0-1.5 ft. | 1.5-3.0 ft. | C-0.3 ft. | 0-1.5 ft. | 1.5-3.0 ft. | -- | -- | 0-0.3 ft. |
| Sample Id: | SE-0120 98-JOS-27 | SE-0120 98-JOS-28 | SE-0120 98-JOS-29 | SE-0120 98-JOS-30 | SE-0120 98-JOS-31 | SE-0120 98-JOS-32 | PT-010998-CFD-004 | SE-0120 98-JDS-2 | SE-0120 98-JDS-04 |
| Sample Date: | 01/21/98 | 01/21/98 | 01/21/98 | 01/21/98 | 01/21/98 | 01/21/98 | 01/09/98 | 01/09/98 | 01/20/98 |
| Parameters | Units | Dupl. | | | | | | | |
| <u>Semi-volatile Organics (Cont'd)</u> | | | | | | | | | |
| N-Nitrosodiphenylamine | ug/kg | ND 39 | ND 40 | ND 38 | ND 39 | ND 54 | ND 19 | ND 39 | ND 39 |
| Naphthalene | ug/kg | 630 J | 1500 J | 1900 | 56 J | 1600 J | 33 | 730 J | 730 J |
| Phenanthrene | ug/kg | 1400 J | 1600 J | 1600 | 1400 J | 2600 J | 540 J | <600 J | <600 J |
| Fyrene | ug/kg | 5300 J | 6100 | 7000 J | 7000 J | 2500 J | 1100 J | <800 J | <800 J |
| <u>Metals</u> | | | | | | | | | |
| Antimony | mg/kg | 1.3 J | 13 J | 5.8 | ND 0.2 | 1.3 J | 1.3 J | 7.0 J | 2.0 J |
| Arsenic | mg/kg | 18 J | 50 | 16 | 15 J | 35 J | 24 J | 42 J | 20 J |
| Cadmium | mg/kg | 0.7 J | 1.6 | 1.2 | 0.37 J | 1.5 J | 1.5 J | 0.36 J | 0.7 J |
| Chromium | mg/kg | 62 J | 130 | 96 | 27 J | 34 J | 31 J | 83 J | 69 J |
| Copper | mg/kg | 180 J | 900 | 1900 | 90 J | 110 J | 190 J | 330 J | 190 J |
| Lead | mg/kg | 170 J | 760 | 380 | 84 J | 230 J | 180 J | 350 J | 170 J |
| Mercury | mg/kg | 0.28 J | 0.69 | 0.35 | 0.15 J | 0.57 J | 0.48 J | 0.21 J | 0.32 J |
| Nickel | mg/kg | 33 J | 70 | 65 | 21 J | 46 J | 49 J | 59 J | 36 J |
| Silver | mg/kg | 0.49 J | 2.3 | 1.6 | 0.27 J | 0.60 J | 0.56 J | 0.6 J | 0.5 J |
| Zinc | mg/kg | 260 J | 950 | 570 | 130 J | 220 J | 240 J | 860 J | 300 J |
| <u>Pesticides/PCBs</u> | | | | | | | | | |
| 4,4'-DDD | ug/kg | ND 19 | ND 19 | 20 J | 8.9 J | ND 24 | ND 29 | ND 6.8 | 14 J |
| 4,4'-DDDE | ug/kg | ND 19 | ND 19 | ND 93 | ND 1.9 | ND 29 | ND 65 | ND 3.1 | ND 6.8 |
| 4,4'-DDT | ug/kg | ND 19 | ND 19 | ND 12 | ND 35 J | ND 28 | ND 57 | ND 1.9 | ND 14 |
| Aldrin | ug/kg | ND 9.3 | ND 13 | ND 0.96 | ND 0.97 | ND 13 | ND 14 | ND 0.96 | ND 0.94 |
| alpha-Chlordane | ug/kg | ND 9.3 | ND 9.4 | ND 11 | ND 9.7 | ND 28 | ND 96 | ND 0.96 | ND 0.94 |
| Aroclor 1016 | ug/kg | ND 190 | ND 190 | ND 190 | ND 19 | ND 200 | ND 290 | ND 19 | ND 19 |
| Aroclor 1221 | ug/kg | ND 370 | ND 380 | ND 380 | ND 39 | ND 390 | ND 580 | ND 38 | ND 38 |
| Aroclor 1232 | ug/kg | ND 190 | ND 190 | ND 190 | ND 19 | ND 200 | ND 290 | ND 19 | ND 19 |
| Aroclor 1242 | ug/kg | ND 190 | ND 190 | ND 190 | ND 19 | ND 200 | ND 290 | ND 19 | ND 19 |
| Aroclor 1248 | ug/kg | 180 J | 430 J | 370 J | 100 J | ND 19 | ND 19 | ND 19 | 180 J |
| Aroclor 1254 | ug/kg | ND 190 | 500 J | 530 J | 840 J | ND 19 | ND 19 | ND 19 | 280 J |
| Aroclor 1260 | ug/kg | ND 19 | ND 5.0 | ND 5.0 | ND 51 | ND 20 | ND 51 | ND 1.9 | ND 1.9 |
| Dieldrin | ug/kg | ND 9.3 | ND 4.4 | ND 4.4 | ND 0.97 | ND 14 | ND 14 | ND 0.96 | ND 0.94 |
| gamma-BHC (Lindane) | ug/kg | ND 14 | ND 18 | ND 16 | ND 44 | ND 75 | ND 10 | ND 5.5 | ND 10 |
| gamma-Chloriane | ug/kg | ND 9.3 | ND 3.6 | ND 0.97 | ND 15 | ND 15 | ND 14 | 1.9 | ND 1.6 |
| Heptachlor | ug/kg | | | | | | | | |

Table A.2

Analytical Data
Embankment: Beneath Pier 25
Port of Tacoma Industrial Yard
Tacoma, Washington

| <u>Sample Location:</u> | 3A | 3A | 3A | 3B | 3E | 3B | 5 | 5A |
|--------------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|------------------|-------------------|
| <u>Sample Depth:</u> | 0-0.3 ft. | 0-1.5 ft. | 1.5-3.0 ft. | 0-0.3 ft. | 0-1.5 ft. | 1.5-3.0 ft. | -- | 0-0.3 ft. |
| <u>Sample Id:</u> | SE-#120 98-JOS-27 | SE-0120 98-JOS-28 | SE-0120 98-JOS-29 | SE-0120 98-JOS-30 | SE-0120 98-JOS-31 | SE-0120 98-JOS-32 | PT-01098-CFD-004 | SE-0120 98-JOS-20 |
| <u>Sample Date:</u> | 01/21/98 | 01/21/98 | 01/21/98 | 01/21/98 | 01/21/98 | 01/21/98 | 01/09/98 | 01/20/98 |
| <u>Parameter</u> | | | | | | | | |
| <u>Units</u> | | | | | | | | |
| Volatile Organics | | | | | | | | |
| Ethylbenzene | ND 1.9 | 1.6 U | ND 1.1 | ND 1.5 | 11 J | 21 J | ND 0.9 | ND 1.8 |
| n,p-Xylenes | ND 3.8 | 3.3 U | ND 2.1 | ND 3.0 | 28 J | 40 J | ND 1.7 | ND 3.6 |
| o-Xylene | ND 1.9 | 1.6 U | ND 1.1 | ND 1.5 | 18 J | 2 J | ND 0.9 | ND 1.8 |
| Tetrachloroethylene | 1.6 J | 1.6 U | 1.1 J | ND 1.5 | ND 3.1 | ND 2.7 | 3.0 | ND 1.8 |
| Trichloroethane | ND 1.9 | 2.4 | 1.1 | ND 1.5 | ND 2.7 | ND 2.7 | 1.2 | ND 1.8 |

Table A.2

Analytical Data
Embankment Beneath Pier 25
Port of Tacoma Industrial Yard
Tacoma, Washington

| Sample Location: | 5A | 5A | 5B | 5B | 5B | 5B | 5B | 5B | 6 | 7 | 7A |
|----------------------------|-------------------|-------------------|------------------------|-----------------------|-------------------|---------------------|-------------------|---------------------|-------------------|---------------------|-------------------|
| Sample Depth: | 0-1.0 ft. | 1.0-3.0 ft. | 0-0.3 ft. | 0-0.5 ft. | 1.5-3.0 ft. | - | - | - | - | - | 0-0.3 ft. |
| Sample ID: | SE-0120-98-JOS-21 | SE-0120-98-JOS-22 | SE-0120-98-JOS-23 | SE-0120-98-JOS-24 | SE-0120-98-JCS-25 | PT-010998-CFD-014 | PT-010998-CFD-005 | SE-0120-98-JOS-13 | SE-010998-CFD-005 | SE-0120-98-JOS-13 | |
| Sample Date: | 0 /20/98 | 01/20/98 | 01/20/98 | 01/20/98 | 01/20/98 | 01/09/98 | 01/09/98 | 01/20/98 | 01/09/98 | 01/20/98 | 01/20/98 |
| Parameters | Units | Acid Extractables | Semi-volatile Organics | Fluorinated Compounds | Organic Compounds | Inorganic Compounds | Organic Compounds | Inorganic Compounds | Organic Compounds | Inorganic Compounds | Organic Compounds |
| 2,4-Dimethylphenol | ug/kg | ND 150 | ND 87 | ND 580 | ND 40 | ND 110 | ND 19 | ND 83 | ND 19 | ND 19 | ND 33 |
| 2-Methylphenol | ug/kg | ND 380 | ND 87 | ND 580 | ND 40 | ND 110 | ND 19 | ND 83 | ND 19 | ND 19 | ND 33 |
| 4-Methylphenol | ug/kg | 870 J | 440 J | 39 J | ND 40 | ND 110 | ND 19 | ND 83 | ND 19 | ND 19 | ND 33 |
| Pentachlorophenol | ug/kg | ND 760 | ND 430 | ND 2900 | ND 40 | ND 40 | ND 93 | ND 97 | ND 19 | ND 19 | ND 420 |
| Phenol | ug/kg | ND 380 | ND 87 | ND 580 | ND 40 | ND 110 | ND 19 | ND 83 | ND 19 | ND 19 | ND 83 |
| 1,1,4-Trichlorobenzene | ug/kg | ND 150 | ND 87 | ND 580 | 190 J | 350 J | ND 19 | ND 33 | ND 19 | ND 19 | ND 33 |
| 1,2-Dichlorobenzene | ug/kg | ND 380 | ND 87 | ND 580 | ND 40 | ND 110 | ND 19 | ND 33 | ND 19 | ND 19 | ND 33 |
| 1,3-Dichlorobenzene | ug/kg | ND 380 | ND 87 | ND 580 | 50 J | ND 110 | ND 19 | ND 33 | ND 19 | ND 19 | ND 33 |
| 1,4-Dichlorobenzene | ug/kg | 660 J | 540 J | 200 J | 350 J | 310 J | 30 | 150 J | 140 J | 140 J | 150 J |
| 2-Methylnaphtalene | ug/kg | 2000 J | 000 J | 1200 J | 520 J | 480 J | 30 | 450 J | 26 | 26 | 450 J |
| Acenaphthene | ug/kg | ND 87 | ND 87 | 410 J | 110 J | ND 110 | 38 | 230 J | 22 | 22 | 230 J |
| Acenaphthylene | ug/kg | 2000 J | 30 J | 8600 J | 1700 J | 1900 J | 380 | 220 J | 160 | 160 | 220 J |
| Athracene | ug/kg | 1600 J | 690 J | 6300 J | 2800 J | 2000 J | 2200 | 530 J | 250 | 250 | 530 J |
| benzo(a)Anthracene | ug/kg | 960 J | 290 J | 4400 J | 3000 J | 1500 J | 2400 | 510 J | 310 J | 310 J | 510 J |
| benzo(a)Pyrene | ug/kg | 1100 J | 300 J | 4800 J | 3400 J | 1600 J | 2600 | 510 J | 440 J | 440 J | 510 J |
| benzo(b)Fluoranthene | ug/kg | ND 220 | 1200 J | 1000 J | 530 J | 530 J | 800 | 1100 J | 150 J | 150 J | 1100 J |
| benzo(g,h,i)Pertene | ug/kg | 1100 J | 390 J | 5300 J | 3600 J | 1700 J | 2400 | 550 J | 310 J | 310 J | 550 J |
| benzo(k)Fluoranthene | ug/kg | 330 J | 20 J | 1100 J | 1000 J | 900 J | 370 | 1200 J | 370 | 370 | 1200 J |
| bis(2-ethylhexyl)Phthalate | ug/kg | ND 150 | ND 220 | ND 580 | ND 40 | ND 110 | 2500 | ND 83 | 29 | 29 | ND 83 |
| Bisphenol A Phthalate | ug/kg | 1800 J | 900 J | 9100 J | 5400 J | 2500 J | 2400 | 6600 J | 390 | 390 | 6600 J |
| Crysgene | ug/kg | ND 150 | ND 87 | ND 580 | ND 40 | ND 110 | 36 | ND 83 | ND 19 | ND 19 | ND 83 |
| di-N-Buylphthalate | ug/kg | ND 150 | ND 220 | ND 580 | ND 40 | ND 110 | ND 190 | ND 83 | ND 19 | ND 19 | ND 83 |
| di-N-Octyl phthalate | ug/kg | ND 150 | ND 220 | 590 J | 710 J | 390 J | 330 | 1300 J | 63 J | 63 J | 1300 J |
| dibenz(a,h)Anthracene | ug/kg | 1500 J | 990 J | 630 J | 520 J | 380 J | 53 | 270 J | 53 | 53 | 270 J |
| Dibenzofuran | ug/kg | ND 150 | ND 87 | ND 580 | ND 40 | ND 110 | ND 19 | ND 83 | ND 19 | ND 19 | ND 83 |
| Diethyl phthalate | ug/kg | ND 150 | ND 87 | ND 580 | ND 40 | ND 110 | 38 | ND 83 | ND 19 | ND 19 | ND 83 |
| Dimethylphthalate | ug/kg | 6000 J | 300 J | 23000 J | 12000 J | 6700 J | 3300 | 1500 J | 380 J | 380 J | 20000 J |
| Fluoranthene | ug/kg | 2100 J | 400 J | 1800 J | 610 J | 570 J | 110 | 550 J | 33 | 33 | 550 J |
| Fluorene | ug/kg | ND 150 | ND 87 | ND 580 | 230 J | 220 J | 42 | ND 83 | ND 19 | ND 19 | ND 83 |
| Hexachlorobenzene | ug/kg | ND 150 | ND 87 | ND 580 | 270 J | 280 J | ND 19 | ND 83 | ND 19 | ND 19 | ND 83 |
| Hexachlorobutadiene | ug/kg | ND 150 | ND 87 | ND 580 | ND 40 | ND 110 | ND 19 | ND 83 | ND 19 | ND 19 | ND 83 |
| Hexachloroethane | ug/kg | ND 150 | ND 220 | 1600 J | 1400 J | 1600 J | 1500 J | 1600 J | 1500 J | 1500 J | 2100 J |

Table A.2

Analytical Data
Embankment Beneath Pier 25
Port of Tacoma Industrial Yard
Tacoma, Washington

| Parameter | Units | Sample Location: | Sample Depth: | Sample ID: | Sample Date: | 5A 0-1.0 ft. | 5A 1.0-1.0 ft. | 5B 0-0.3 ft. | 5B 1-1.5 ft. | 5F SE-0120 98-JOS-24 | 5F SE-0120 98-JOS-25 | 6 PT-010998-CFD-005 | 6 PT-010998-CFD-014 | 7 01/09/98 | 7 01/09/98 | 7A 0-0.3 ft. |
|---------------------------------|-------|------------------|---------------|------------|--------------|-----------------|-------------------|-----------------|-----------------|-------------------------|-------------------------|------------------------|------------------------|---------------|---------------|-----------------|
| Semi-volatile Organics (Cont'd) | ug/kg | ND 150 | ND 87 | ND 580 | ND 40 | ND 110 | ND 19 | ND 19 | ND 19 | ND 33 | ND 33 | ND 19 | ND 19 | ND 33 | ND 33 | ND 33 |
| N-Nitrosodiphenylamine | ug/kg | 3000 J | 2300 J | 190 J | 1000 J | 1000 J | 1000 J | 1400 J | 1400 J | 3;1 | 3;1 | 170 J | 170 J | 170 J | 170 J | 170 J |
| Naphthalene | ug/kg | 7800 J | 6200 J | 12000 J | 1700 J | 1700 J | 1700 J | 12000 J | 12000 J | 1300 J | 1300 J | 2900 J | 2900 J | 2900 J | 2900 J | 2900 J |
| Phenanthrene | ug/kg | 4500 J | 2900 J | 16000 J | 12000 J | 12000 J | 12000 J | 8000 J | 8000 J | 3400 J | 3400 J | 13000 J | 13000 J | 13000 J | 13000 J | 13000 J |
| Solvents | mg/kg | R | R | R | R | 4.5 J | 1.5 J | 6.1 J | 6.1 J | 23 J | 23 J | 1.3 J | 1.3 J | 1.3 J | 1.3 J | 1.3 J |
| Acetone | mg/kg | 3.6 J | 4.9 J | 1.6 J | 3.4 J | 3.4 J | 3.3 J | 5;1 J | 5;1 J | 17 J | 17 J | 28 J | 28 J | 28 J | 28 J | 28 J |
| Acetone | mg/kg | 0.9 J | 0.47 J | 0.48 J | 0.48 J | 2.1 J | 1.6 J | 1.6 J | 1.6 J | 1.5 J | 1.5 J | 0.63 J | 0.63 J | 0.63 J | 0.63 J | 0.63 J |
| Cadmium | mg/kg | 15 J | 10 J | 29 J | 48 J | 48 J | 47 J | 47 J | 47 J | 14C J | 14C J | 57 J | 57 J | 57 J | 57 J | 57 J |
| Chromium | mg/kg | 50 J | 33 J | 110 J | 130 J | 130 J | 130 J | 160 J | 160 J | 31C J | 31C J | 160 J | 160 J | 160 J | 160 J | 160 J |
| Copper | mg/kg | 190 J | 68 J | 62 J | 430 J | 430 J | 250 J | 250 J | 250 J | 37C J | 37C J | 100 J | 100 J | 120 J | 120 J | 120 J |
| Lead | mg/kg | 0.20 J | 0.15 J | 0.18 J | 0.59 J | 0.59 J | 0.88 J | 0.88 J | 0.88 J | 0.24 J | 0.24 J | 0.27 J | 0.27 J | 0.27 J | 0.27 J | 0.27 J |
| Mercury | mg/kg | 22 J | 17 J | 23 J | 74 J | 74 J | 48 J | 48 J | 48 J | 77 J | 77 J | 23 J | 23 J | 27 J | 27 J | 27 J |
| Nickel | mg/kg | 0.73 J | 0.49 J | 0.32 J | 0.7 J | 0.7 J | 0.8 J | 0.8 J | 0.8 J | 0.16 J | 0.16 J | 0.42 J | 0.42 J | 0.42 J | 0.42 J | 0.42 J |
| Silver | mg/kg | 210 J | 140 J | 150 J | 390 J | 390 J | 290 J | 290 J | 290 J | 130C J | 130C J | 280 J | 280 J | 280 J | 280 J | 280 J |
| Metals | mg/kg | | | | | | | | | | | | | | | |
| Antimony | ug/kg | ND 1.9 | ND 5.0 | ND 38 | ND 38 | ND 16 | ND 16 | ND 3.3 | ND 3.3 | 3.9 J | 3.9 J | ND 12 | ND 12 | ND 12 | ND 12 | ND 12 |
| Arsenic | ug/kg | ND 1.9 | ND 3.9 | ND 38 | ND 38 | ND 30 | ND 30 | ND 4.4 | ND 4.4 | ND 4.4 | ND 4.4 | ND 9 | ND 9 | ND 9 | ND 9 | ND 9 |
| Cadmium | ug/kg | ND 1.9 | ND 1.9 | ND 38 | ND 38 | ND 93 | ND 93 | ND 0.97 | ND 0.97 | ND 0.97 | ND 0.97 | ND 1.4 | ND 1.4 | ND 1.4 | ND 1.4 | ND 1.4 |
| Chromium | ug/kg | ND 0.95 | ND 0.97 | ND 75 | ND 82 | ND 27 | ND 29 | ND 0.93 | ND 0.93 | ND 0.93 | ND 0.93 | ND 3.96 | ND 3.96 | ND 3.96 | ND 3.96 | ND 3.96 |
| Copper | ug/kg | ND 0.95 | ND 0.96 | ND 2.0 | ND 2.0 | ND 380 | ND 380 | ND 93 | ND 93 | ND 93 | ND 93 | ND 96 | ND 96 | ND 96 | ND 96 | ND 96 |
| Lead | ug/kg | ND 19 | ND 19 | ND 39 | ND 770 | ND 760 | ND 760 | ND 190 | ND 190 | ND 39 | ND 39 | ND 190 | ND 190 | ND 190 | ND 190 | ND 190 |
| Mercury | ug/kg | ND 19 | ND 19 | ND 19 | ND 380 | ND 380 | ND 380 | ND 93 | ND 93 | ND 93 | ND 93 | ND 96 | ND 96 | ND 96 | ND 96 | ND 96 |
| Nickel | ug/kg | ND 19 | ND 19 | ND 19 | ND 380 | ND 380 | ND 380 | ND 93 | ND 93 | ND 93 | ND 93 | ND 96 | ND 96 | ND 96 | ND 96 | ND 96 |
| Silver | ug/kg | ND 19 | ND 19 | ND 97 | ND 97 | ND 93 | ND 93 | ND 93 | ND 93 | ND 93 | ND 93 | ND 96 | ND 96 | ND 96 | ND 96 | ND 96 |
| Zinc | ug/kg | ND 19 | ND 19 | ND 19 | ND 19 | ND 19 | ND 19 | ND 19 | ND 19 | ND 19 | ND 19 | ND 96 | ND 96 | ND 96 | ND 96 | ND 96 |
| Pesticides/PCBs | ug/kg | | | | | | | | | | | | | | | |
| 4,4'-DDD | ug/kg | ND 1.9 | ND 1.9 | ND 1.9 | ND 1.9 | ND 1.9 | ND 1.9 | ND 1.9 | ND 1.9 | ND 1.9 | ND 1.9 | ND 12 | ND 12 | ND 12 | ND 12 | ND 12 |
| 4,4'-DDE | ug/kg | ND 1.9 | ND 1.9 | ND 1.9 | ND 1.9 | ND 1.9 | ND 1.9 | ND 1.9 | ND 1.9 | ND 1.9 | ND 1.9 | ND 9 | ND 9 | ND 9 | ND 9 | ND 9 |
| 4,4'-DDT | ug/kg | ND 1.9 | ND 1.9 | ND 1.9 | ND 1.9 | ND 1.9 | ND 1.9 | ND 1.9 | ND 1.9 | ND 1.9 | ND 1.9 | ND 9 | ND 9 | ND 9 | ND 9 | ND 9 |
| Aldrin | ug/kg | ND 0.95 | ND 0.95 | ND 0.97 | ND 0.97 | ND 75 | ND 82 | ND 0.93 | ND 0.93 | ND 0.93 | ND 0.93 | ND 3.96 | ND 3.96 | ND 3.96 | ND 3.96 | ND 3.96 |
| alpha-Chlordane | ug/kg | ND 0.95 | ND 0.96 | ND 2.0 | ND 2.0 | ND 27 | ND 29 | ND 0.93 | ND 0.93 | ND 0.93 | ND 0.93 | ND 96 | ND 96 | ND 96 | ND 96 | ND 96 |
| Aroclor 1016 | ug/kg | ND 19 | ND 19 | ND 38 | ND 38 | ND 38 | ND 38 | ND 30 | ND 30 | ND 30 | ND 30 | ND 190 | ND 190 | ND 190 | ND 190 | ND 190 |
| Aroclor 1221 | ug/kg | ND 19 | ND 19 | ND 19 | ND 19 | ND 19 | ND 19 | ND 19 | ND 19 | ND 19 | ND 19 | ND 96 | ND 96 | ND 96 | ND 96 | ND 96 |
| Aroclor 1232 | ug/kg | ND 19 | ND 19 | ND 19 | ND 19 | ND 19 | ND 19 | ND 19 | ND 19 | ND 19 | ND 19 | ND 96 | ND 96 | ND 96 | ND 96 | ND 96 |
| Aroclor 1242 | ug/kg | ND 19 | ND 19 | ND 19 | ND 19 | ND 19 | ND 19 | ND 19 | ND 19 | ND 19 | ND 19 | ND 96 | ND 96 | ND 96 | ND 96 | ND 96 |
| Aroclor 1248 | ug/kg | ND 19 | ND 19 | ND 32 | ND 32 | ND 97 | ND 97 | ND 93 | ND 93 | ND 93 | ND 93 | ND 96 | ND 96 | ND 96 | ND 96 | ND 96 |
| Aroclor 1254 | ug/kg | ND 19 | ND 19 | ND 19 | ND 19 | ND 19 | ND 19 | ND 19 | ND 19 | ND 19 | ND 19 | ND 96 | ND 96 | ND 96 | ND 96 | ND 96 |
| Dieldrin | ug/kg | ND 1.9 | ND 1.9 | ND 1.9 | ND 1.9 | ND 1.9 | ND 1.9 | ND 0.97 | ND 0.97 | ND 0.97 | ND 0.97 | ND 1.9 | ND 1.9 | ND 1.9 | ND 1.9 | ND 1.9 |
| Gamma-BHC (Lindane) | ug/kg | ND 0.99 | ND 0.99 | ND 0.97 | ND 0.97 | ND 1.8 | ND 1.8 | ND 44 | ND 44 | ND 44 | ND 44 | ND 1.2 | ND 1.2 | ND 1.2 | ND 1.2 | ND 1.2 |
| gamma-Chlordane | ug/kg | ND 0.95 | ND 0.95 | ND 0.95 | ND 0.95 | ND 0.95 | ND 0.95 | ND 0.95 | ND 0.95 | ND 0.95 | ND 0.95 | ND 1.7 | ND 1.7 | ND 1.7 | ND 1.7 | ND 1.7 |
| Heptachlor | ug/kg | ND 0.95 | ND 0.95 | ND 0.95 | ND 0.95 | ND 0.95 | ND 0.95 | ND 0.95 | ND 0.95 | ND 0.95 | ND 0.95 | ND 1.5 | ND 1.5 | ND 1.5 | ND 1.5 | ND 1.5 |

Table A.2

Analytical Data
Embankment: Beneath Pier 25
Port of Tacoma Industrial Yard
Tacoma, Washington

| <u>Parameter</u> | <u>Units</u> | 5A 0-1.0 ft. | 5A 1.0-1.0 ft. | 5B 0-0.3 ft. | 5B 0-1.5 ft. | 5E 1.5-3.0 ft. | 6 | 7 | 7A |
|--------------------------|--------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|
| <u>Sample Location:</u> | | SE-0120 98-JOS-21 | SE-0120 98-JOS-22 | SE-0120 98-JOS-23 | SE-0120 98-JOS-24 | SE-0120 98-JOS-25 | PT-010998-CFD-C14 | PT-010998-CFD-005 | SE-0120 98-JOS-13 |
| <u>Sample Depth:</u> | | 01/20/98 | 01/20/98 | 01/20/98 | 01/20/98 | 01/20/98 | 01/20/98 | 01/09/98 | 01/20/98 |
| <u>Sample lot:</u> | | | | | | | | | |
| <u>Sample Date:</u> | | | | | | | | | |
| <hr/> | | | | | | | | | |
| Volatile Organics | | | | | | | | | |
| Ethylbenzene | ug/kg | 19 J | 9.7 J | ND 1.7 | 32 J | 12 J | ND 2.3 | ND 0.9 | ND 1.6 |
| n,p-Xylene | ug/kg | 14 J | 14 J | ND 3.5 | 28 J | 11 J | ND 4.5 | ND 1.7 | ND 3.1 |
| e-Xylene | ug/kg | 17 J | 11 J | ND 1.7 | 22 J | 8.9 J | ND 2.3 | ND 0.9 | ND 1.6 |
| Tetrachloroethylene | ug/kg | ND 2.5 | ND 4.2 | ND 1.7 | 2.9 J | ND 2.1 | ND 2.1 | ND 0.9 | ND 1.6 |
| Trichloroethene | ug/kg | 2.7 J | ND 4.2 | ND 1.7 | ND 2.7 | ND 2.1 | ND 2.1 | ND 0.9 | ND 1.6 |

Table A.2

Analytical Data
 Embankment Beneath Pier 25
 Port of Tacoma Industrial Yard
 Tacoma, Washington

| Parameter | Units | 7A 0-1.5 ft. | 7A 1.5-3.0 ft. | 7A 3.0-4.5 ft. | 7B 4-0.3 ft. | 7B 0-1.5 ft. | 7B 1.5-3.0 ft. | 7B 3.0-4.5 ft. | 8 4-0.3 ft. | 8 0-1.5 ft. | 9 0-0.3 ft. | |
|-------------------------------|-------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|----------------|----------------|----------------|--------|
| Sample Location: | | SE-0120 98-JOS-14 | SE-0120 98-JOS-15 | SE-0120 98-JOS-16 | SE-0120 98-JOS-17 | SE-0120 98-JOS-18 | SE-0120 98-JOS-19 | SE-0120 98-JOS-19 | ND 65 | ND 65 | ND 42 | |
| Sample Depth: | | 01/20/98 | 01/22/98 | 01/20/98 | 01/20/98 | 01/20/98 | 01/20/98 | 01/20/98 | ND 65 | ND 65 | ND 42 | |
| Sample ID: | | | | | | | | | ND 65 | ND 65 | ND 42 | |
| Sample Date: | | | | | | | | | ND 65 | ND 65 | ND 42 | |
| | Dupl. | | | | | | | | ND 65 | ND 65 | ND 42 | |
| Acid Extractables | | | | | | | | | | | | |
| 2,4-Dimethylphenol | ug/kg | ND 55 | ND 40 | ND 59 | ND 60 | ND 57 | ND 57 | ND 57 | ND 65 | ND 65 | ND 42 | ND 19 |
| 2-Methylphenol | ug/kg | ND 55 | ND 40 | ND 59 | ND 60 | ND 57 | ND 57 | ND 57 | ND 65 | ND 65 | ND 42 | ND 19 |
| 4-Methylphenol | ug/kg | ND 55 | ND 40 | ND 59 | ND 60 | ND 57 | ND 57 | ND 57 | ND 65 | ND 65 | ND 42 | 37 |
| Fenachlorophenol | ug/kg | ND 270 | ND 300 | ND 300 | ND 300 | NE 290 | NE 290 | NE 290 | ND 330 | ND 330 | ND 210 | ND 95 |
| Phenol | ug/kg | ND 55 | ND 40 | ND 95 | ND 76 | ND 57 | ND 57 | ND 57 | ND 65 | ND 65 | ND 42 | ND 19 |
| Semi-volatile Organics | | | | | | | | | | | | |
| 1,2,4-Trichlorobenzene | ug/kg | ND 55 | ND 40 | ND 59 | ND 60 | ND 57 | ND 57 | ND 57 | ND 65 | ND 65 | ND 42 | ND 19 |
| 1,2-Dichlorobenzene | ug/kg | ND 55 | ND 40 | ND 59 | ND 60 | ND 57 | ND 57 | ND 57 | ND 65 | ND 65 | ND 42 | ND 19 |
| 1,3-Dichlorobenzene | ug/kg | ND 55 | ND 40 | ND 59 | ND 60 | ND 57 | ND 57 | ND 57 | ND 65 | ND 65 | ND 42 | ND 19 |
| 1,4-Dichlorobenzene | ug/kg | ND 55 | ND 40 | ND 59 | ND 60 | ND 57 | ND 57 | ND 57 | ND 65 | ND 65 | ND 42 | ND 19 |
| 2-Methylphthalene | ug/kg | 54 J | 60 | 85 | 67 | 83 | 83 | 83 | 140 J | 140 J | 120 | 43 |
| Acenaphthene | ug/kg | 8800 | 7800 J | 3700 J | 180 | 200 | 200 | 200 | 160 J | 160 J | 710 | 58 |
| Acenaphthylene | ug/kg | 85 | 85 | ND 59 | 250 | 150 | 150 | 150 | 96 J | 96 J | 97 | 36 |
| Anthracene | ug/kg | 1600 | 990 | 900 | 3100 | 680 | 680 | 680 | 1000 J | 1000 J | 2000 | 220 |
| benzo(a)Anthracene | ug/kg | 1400 | 1300 | 1000 | 4300 | 1100 | 1100 | 1100 | 1400 J | 1400 J | 4500 | 600 J |
| benzo(a)Pyrene | ug/kg | 1300 | 1600 | 990 | 3000 | 1700 | 1700 | 1700 | 1200 J | 1200 J | 3400 | 600 J |
| benzo(b)Fluoranthene | ug/kg | 1200 | 1600 | 1300 | 3700 | 2900 | 2900 | 2900 | 1800 J | 1800 J | 3400 | 830 J |
| benzo(g,h)Perylene | ug/kg | 570 | 720 J | 220 J | 610 | 400 | 400 | 400 | 240 J | 240 J | 940 | 590 J |
| benzo(k)Fluoranthene | ug/kg | 1400 | 1800 J | 880 J | 1400 | 1300 | 1300 | 1300 | 890 J | 890 J | 4100 | 700 J |
| bis(2-ethylhexyl)Phthalate | ug/kg | 1600 | 1700 J | 1200 | 890 | 1300 | 1300 | 1300 | 600 J | 600 J | ND 470 | 380 J |
| Butylbenzylphthalate | ug/kg | ND 55 | 120 J | 460 J | ND 60 | ND 57 | ND 57 | ND 57 | ND 42 | ND 42 | ND 42 | ND 19 |
| Chrysene | ug/kg | 1700 | 2000 | 1400 | 5800 | 2000 | 1800 J | 1800 J | 4600 | 4600 | 1100 J | 1100 J |
| di-N-Butylphthalate | ug/kg | 210 | ND 40 | ND 59 | ND 60 | ND 57 | ND 57 | ND 57 | ND 42 | ND 42 | ND 42 | 57 |
| di-N-Octyl phthalate | ug/kg | ND 55 | ND 40 | ND 59 | ND 60 | ND 57 | ND 57 | ND 57 | ND 65 | ND 65 | ND 42 | ND 19 |
| dibenz(a,h)Anthracene | ug/kg | 340 | 450 J | 130 J | 420 | 180 | 180 | 180 | 140 J | 140 J | 750 | 230 J |
| Dibenzofuran | ug/kg | 3900 | 3000 | 2200 | 170 | 170 | 170 | 170 | 160 J | 160 J | 240 | 50 |
| Diethyl phthalate | ug/kg | ND 55 | ND 40 | ND 59 | ND 60 | ND 57 | ND 57 | ND 57 | ND 65 | ND 65 | ND 42 | ND 19 |
| Dimethyl phthalate | ug/kg | ND 55 | ND 40 | ND 59 | ND 60 | ND 57 | ND 57 | ND 57 | ND 65 | ND 65 | ND 42 | ND 19 |
| Fluoranthene | ug/kg | 9100 | 2300 J | 3400 J | 18000 | 2300 | 2300 | 2300 | 5000 J | 5000 J | 11000 | 700 J |
| Fluorene | ug/kg | 3200 | 1200 | 1100 | 450 | 230 | 230 | 230 | 210 J | 210 J | 680 | 69 J |
| Hexachlorobenzene | ug/kg | ND 55 | 46 | ND 59 | ND 60 | ND 57 | ND 57 | ND 57 | ND 65 | ND 65 | ND 42 | 75 J |
| Hexachlorobutadiene | ug/kg | ND 55 | ND 40 | ND 59 | ND 60 | ND 57 | ND 57 | ND 57 | ND 65 | ND 65 | ND 42 | ND 19 |
| Hexachloroetane | ug/kg | ND 55 | ND 40 | ND 59 | ND 60 | ND 57 | ND 57 | ND 57 | ND 65 | ND 65 | ND 42 | ND 19 |
| indeno(1,2,3-d)Pyrene | ug/kg | 670 | 840 J | 320 J | 1100 | 580 | 580 | 580 | 1400 J | 1400 J | 630 J | 630 J |

Table A.2

Analytical Data
 Embankment Beneath Pier 25
 Port of Tacoma Industrial Yard
 Tacoma, Washington

| Sample Location: | 7A | 7A | 7A | 7B | 7B | 7B | 7B | 8 | 9 |
|---------------------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|
| Sample Depth: | 0-1.5 ft. | 1.5-3.0 ft. | 1.5-3.0 ft. | 0-0.3 ft. | 0-0.3 ft. | 1.5-3.0 ft. | 1.5-3.0 ft. | -- | -- |
| Sample Id: | SE-0120 98-JOS-14 | SE-0120 98-JOS-15 | SE-0120 98-JOS-16 | SE-0110 98-JOS-17 | SE-0120 98-JOS-18 | SE-0120 98-JOS-19 | SE-010998-CFD-006 | PT-010998-CFD-007 | PT-010998-CFD-007 |
| Sample Date: | 01/20/98 | 01/22/98 | 01/20/98 | 01/20/98 | 01/20/98 | 01/20/98 | 01/09/98 | 01/09/98 | 01/09/98 |
| Parameters | Units | 7A | 7A | 7A | 7B | 7B | 7B | 8 | 9 |
| Semi-volatile Organics (Cont'd) | ug/kg | ND 55 | ND 40 | ND 59 | ND 60 | ND 57 | ND 42 | ND 19 | ND 19 |
| N-Nitrosodiphenylamine | ug/kg | 550 | 230 J | 720 J | 90 | 220 | 360 J | 86 | 47 |
| Raphthalene | ug/kg | 13000 | 1600 J | 4800 J | 2400 | 1200 | 480 J | 7200 | 490 |
| Phenanthrene | ug/kg | 8200 J | 4800 J | 3900 J | 12000 J | 4200 J | 3300 J | 8400 J | 1400 J |
| Pyrene | ug/kg | | | | | | | | |
| Metals | mg/kg | | | | | | | | |
| Antimony | mg/kg | 14 J | 19 J | 14 J | R | 7.7 J | 2.1 J | 5.0 J | 53 J |
| Arsenic | mg/kg | 25 | 41 J | 24 J | 13 | 200 | 31 J | 67 J | 52 J |
| Cadmium | mg/kg | 2.1 | 2.7 | 1.8 | 0.49 | 1.5 | 1.7 J | 0.43 J | 1.7 J |
| Chromium | mg/kg | 100 | 110 | 91 | 42 | 63 | 37 J | 100 | 180 |
| Copper | mg/kg | 170 | 220 | 160 | 110 | 240 | 140 J | 240 J | 15000 J |
| Lead | mg/kg | 930 J | 600 J | 530 J | 47 J | 360 J | 280 J | 260 J | 2600 J |
| Mercury | mg/kg | 0.93 | 1.1 | 0.69 | 0.14 | 0.75 | 0.74 J | 0.24 | 1.4 |
| Nickel | mg/kg | 76 | 73 | 54 | 38 | 55 | 41 J | 42 | 140 |
| Silver | mg/kg | 0.56 | 0.86 | 0.44 | 0.29 | 1.0 | 0.65 J | 0.18 | 0.26 |
| Zinc | mg/kg | 1200 | 820 | 800 | 180 | 490 | 300 J | 650 J | 2200 J |
| Pesticides/PCFs | ug/kg | | | | | | | | |
| 4,4'-DDD | ug/kg | 29 J | ND 160 | 22 J | 18 J | ND 43 | ND 43 | 88 J | 88 J |
| 4,4'-DDE | ug/kg | ND 35 | ND 160 | ND 15 | ND 3.2 | ND 8.5 | ND 32 | NE 27 | NE 27 |
| 4,4'-DDT | ug/kg | ND 65 | ND 160 | ND 14 | ND 39 | ND 14 | ND 25 | ND 40 | ND 40 |
| Aldrin | ug/kg | ND 16 | ND 78 | ND 93 | ND 0.99 | ND 0.91 | ND 55 | ND 51 | ND 8.8 |
| alpha-Chlordane | ug/kg | ND 12 | ND 78 | ND 5.9 | ND 9.9 | ND 18 | ND 18 | ND 51 | ND 16 |
| Heptachlor | ug/kg | ND 270 | ND 1600 | ND 190 | ND 200 | ND 180 | ND 190 | ND 1000 | ND 90 |
| Heptachlor epoxide | ug/kg | ND 550 | ND 3100 | ND 370 | ND 400 | ND 360 | ND 380 | ND 2100 | ND 180 |
| Aroclor 1016 | ug/kg | ND 270 | ND 1600 | ND 190 | ND 200 | ND 180 | ND 190 | ND 1000 | ND 190 |
| Aroclor 1211 | ug/kg | ND 270 | ND 1600 | ND 190 | ND 200 | ND 180 | ND 190 | ND 1000 | ND 190 |
| Aroclor 1222 | ug/kg | ND 270 | ND 1600 | ND 190 | ND 200 | ND 180 | ND 190 | ND 1000 | ND 190 |
| Aroclor 1242 | ug/kg | ND 270 | ND 1600 | ND 190 | ND 200 | ND 180 | ND 190 | ND 1000 | ND 190 |
| Aroclor 1248 | ug/kg | ND 270 | ND 1600 | ND 190 | ND 200 | ND 180 | ND 190 | ND 1000 | ND 190 |
| Aroclor 1254 | ug/kg | 1400 J | 1600 J | 740 J | 900 J | 550 J | 1100 J | 580 J | 580 J |
| Aroclor 1260 | ug/kg | 2600 J | 2100 J | 900 J | 370 J | 920 J | 820 J | 360 J | 360 J |
| Dieldrin | ug/kg | ND 24 | ND 160 | ND 1.9 | ND 2.0 | ND 24 | ND 1.8 | ND 1.9 | ND 1.9 |
| gamma-BHC (lindane) | ug/kg | ND 2.7 | ND 78 | ND 1.3 | ND 1.5 | ND 9.6 | ND 4.3 | ND 2.1 | ND 2.1 |
| gamma-Chlordane | ug/kg | ND 45 | ND 78 | ND 15 | ND 10 | ND 17 | ND 41 | ND 26 | ND 26 |
| Heptachlor | ug/kg | ND 13 | ND 78 | ND 5.1 | ND 5.1 | ND 32 | ND 10 | ND 4.2 | ND 4.2 |

Table A.2

**Analytical Data
Embankment Beneath Pier 25
Port of Tacoma Industrial Yard
Tacoma, Washington**

Table A.2

Analytical Data
Embankment: Beneath Pier 25
Port of Tacoma Industrial Yard
Tacoma, Washington

| Sample Location: | 9A 0-0.3 ft. | 9A 0-1.5 ft. | 9A 1.5-3.0 ft. | 9B 0-0.3 ft. | 9E 0-1.5 ft. | 9B 1.5-3.0 ft. | 10 SE-0120 98-JOS-07 | 11 SE-0120 98-JOS-08 |
|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|
| Sample Depth: | SE-0120 98-JOS-10 01/20/98 | SE-0120 98-JOS-11 01/20/98 | SE-0120 98-JOS-12 01/20/98 | SE-0120 98-JOS-07 01/20/98 | SE-0120 98-JOS-08 01/20/98 | SE-0120 98-JOS-09 01/20/98 | PT-010998-CFD-012 01/09/98 | PT-010998-CFD-012 01/09/98 |
| Sample lot: | | | | | | | | |
| Sample Date: | | | | | | | | |
| Parameters | Units | | | | | | | |
| 2,4-Dimethylphenol | ug/kg | ND 38 | ND 38 | ND 38 | ND 39 | ND 35 | ND 19 | ND 19 |
| 2-Methylphenol | ug/kg | ND 38 | ND 38 | ND 38 | ND 39 | ND 35 | ND 19 | ND 19 |
| <4 Methylphenol | ug/kg | ND 38 | ND 38 | ND 38 | ND 39 | ND 35 | ND 19 | ND 19 |
| Pentachlorophenol | ug/kg | ND 190 | ND 190 | ND 370 | ND 980 | ND 190 | 190 J | ND 96 |
| Phenol | ug/kg | ND 38 | ND 38 | ND 73 | ND 200 | ND 39 | 27 | 27 |
| <u>Semi-volatile Organics</u> | | | | | | | | |
| 1,2,4-Trichlorobenzene | ug/kg | ND 38 | ND 38 | ND 73 | ND 200 | ND 39 | ND 20 | ND 19 |
| 1,2-Dichlorobenzene | ug/kg | ND 38 | ND 38 | ND 38 | ND 200 | ND 39 | ND 20 | ND 19 |
| 1,3-Dichlorobenzene | ug/kg | ND 38 | ND 38 | ND 73 | ND 200 | ND 39 | ND 20 | ND 19 |
| 1,4-Dichlorobenzene | ug/kg | ND 38 | ND 38 | ND 73 | ND 200 | ND 39 | ND 20 | ND 19 |
| 2-Methylphthalene | ug/kg | 56 | 56 | 71 | 8700 | 59 J | 220 | 530 |
| Acenaphthene | ug/kg | 110 | 110 | 9900 | 9900 | 86 J | 58 J | 550 |
| Arenaphthalene | ug/kg | ND 38 | ND 38 | ND 73 | 240 | 100 J | 76 J | 280 |
| Anthracene | ug/kg | 160 | 160 | 340 | 6500 | 540 J | 230 J | 5800 |
| benzo(a)anthracene | ug/kg | 2500 | 2500 | 500 | 1200 | 8700 | 3500 J | 10000 |
| benzo(a)Pyrene | ug/kg | 600 | 600 | 1400 | 6700 | 3100 J | 1100 J | 2100 |
| benzo(b)Fluoranthene | ug/kg | 2200 | 2200 | 610 | 6100 | 3700 J | 1000 J | 2000 |
| benzo(g,h,i)Perylene | ug/kg | 540 | 260 | 570 | 1800 | 960 J | 420 J | 2600 |
| benzo(k)Fluoranthene | ug/kg | 2300 | 570 | 1400 | 5000 | 3300 J | 1300 J | 8500 |
| bis(2-ethylhexyl)Phthalate | ug/kg | 690 | 690 | 560 | 890 | 1400 J | 660 J | 2400 |
| Butylbenzylphthalate | ug/kg | 100 | 100 | ND 38 | ND 73 | ND 190 | 41 J | 140 J |
| Chrysene | ug/kg | 3900 | 940 | 1700 | 10000 | 4900 J | 1100 J | 14000 J |
| cis-N-Butylphthalate | ug/kg | ND 38 | ND 38 | ND 73 | ND 200 | ND 39 | ND 39 | 3000 |
| cis-N-Octyl phthalate | ug/kg | ND 38 | ND 38 | ND 73 | ND 200 | ND 190 | 66 J | 620 |
| cibenz(a,b)Anthracene | ug/kg | 540 | 140 | 380 | 1600 | 870 J | 320 J | 2200 |
| Dibenzofuran | ug/kg | 95 | 38 | 120 | 6000 | 93 J | 50 J | 440 |
| Diethylphthalate | ug/kg | ND 38 | ND 38 | ND 73 | ND 200 | ND 39 | ND 39 | ND 20 |
| Dimethylphthalate | ug/kg | ND 38 | ND 38 | ND 73 | ND 200 | ND 39 | ND 39 | ND 20 |
| Fluoranthene | ug/kg | 9400 | 960 | 1100 | 28000 | 7200 J | 710 J | 25000 |
| Fluorene | ug/kg | 240 | 56 | 160 | 9800 | 98 J | 67 J | 1100 |
| Hexachlorobenzene | ug/kg | ND 38 | 71 | 110 | ND 200 | 52 J | ND 39 | ND 20 |
| Hexachlorobadiene | ug/kg | ND 38 | ND 38 | ND 73 | ND 200 | 55 J | ND 39 | ND 20 |
| Hexachloroethane | ug/kg | ND 38 | 910 | 320 J | ND 73 | ND 39 | ND 39 | ND 19 |
| Indene(1,2,3-cd)Pyrene | ug/kg | | | | 2500 J | 500 J | 600 J | 4500 |

Table A.2

Analytical Data
Embankment Beneath Pier 25
Port of Tacoma Industrial Yard
Tacoma, Washington

| Parameters | Units | 9A 0-0.3 ft. | 9A 0-1.5 ft. | 9A 1.5-3.0 ft. | 9B 0-0.3 ft. | 9B 0-1.5 ft. | 9B 1.5-3.0 ft. | 10 SE-0120 98:IOS-07 SE-0120 98:IOS-08 SE-0120 98:IOS-09 | 11 PT-010998-CFD-012 PT-010998-CFD-013 01/09/98 |
|--------------------------------|-------|------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|---|--|
| Sample Location: | | SE-120 98:IOS-10 01/20/98 | SE-0120 98:IOS-11 01/20/98 | SE-0120 98:IOS-12 01/20/98 | SE-0120 98:IOS-07 01/20/98 | SE-0120 98:IOS-08 01/20/98 | SE-0120 98:IOS-09 01/20/98 | ND 19 ND 20 ND 20 | ND 19 ND 20 ND 20 |
| Sample Depth: | | | | | | | | 140 15000 19000 | 140 15000 19000 |
| Sample ID: | | | | | | | | 240 450 450 | 240 4500 4500 |
| Sample Date: | | | | | | | | 15000 19000 | 15000 19000 |
| Samples | | | | | | | | | |
| | | | | | | | | | |
| Semi-volatile Organics (Ctn'd) | | | | | | | | | |
| Nitroodiphenylamine | ug/kg | ND 38 | ND 38 | ND 73 | ND 200 | ND 39 | ND 39 | ND 20 | ND 19 |
| Naphthalene | ug/kg | 57 | 62 | 170 | 11000 | 240 J | 75 J | 140 | 240 |
| Phenanthrene | ug/kg | 1100 | 300 | 1100 | 48000 | 630 J | 450 J | 15000 | 4500 |
| Pyrene | ug/kg | 7100 J | 1200 J | 2800 J | 26000 J | 8100 J | 2200 J | 19000 | 5600 |
| Metals | | | | | | | | | |
| Antimony | mg/kg | 29 J | 48 J | 69 J | 0.86 J | 4.1 J | 10 J | 33 J | 4.1 J |
| Arsenic | mg/kg | 42 | 63 | 64 | 16 | 40 J | 63 J | 64 J | 36 J |
| Cadmium | mg/kg | 1.6 | 4.1 | 7.5 | 0.45 | 1.1 J | 1.4 J | 1.2 J | 0.39 J |
| Chromium | mg/kg | 130 | 240 | 210 | 26 | 40 J | 72 J | 200 | 81 |
| Copper | mg/kg | 250 | 380 | 490 | 150 J | 140 J | 150 J | 1100 J | 220 J |
| Lead | mg/kg | 390 J | 1900 J | 1800 J | 64 J | 220 J | 240 J | 1100 J | 330 |
| Mercury | mg/kg | 0.38 | 2.3 | 1.6 | 0.15 | 0.53 J | 0.53 J | 1.1 | 0.34 |
| Nickel | mg/kg | 79 | 140 | 200 | 20 | 34 J | 33 J | 93 | 38 |
| Silver | mg/kg | 0.40 | 0.39 | 0.49 | 0.27 | 0.8 J | 0.9 J | 0.36 | 0.21 |
| Zinc | mg/kg | 740 | 2300 | 2100 | 160 J | 310 J | 310 J | 160 J | 530 J |
| Pesticides/PCBs | | | | | | | | | |
| 4,4'-DDD | ug/kg | 22 J | 71 J | 92 J | ND 7.1 | ND 180 | 13 J | ND 28 | ND 130 |
| 4,4'-DDDE | ug/kg | ND 30 | ND 42 | ND 63 | ND 7.2 | ND 180 | ND 11 | ND 8.4 | ND 130 |
| 4,4'-DDT | ug/kg | ND 48 | ND 33 | ND 34 | ND 2 | ND 180 | ND 83 | ND 140 | ND 130 |
| Aldrin | ug/kg | ND 22 | ND 22 | ND 30 | ND 1.1 | ND 89 | ND 2.9 | ND 0.98 | ND 65 |
| alpha-Chlordane | ug/kg | ND 10 | ND 16 | ND 31 | ND 0.99 | ND 89 | ND 0.92 | ND 0.98 | ND 65 |
| beta-Chlordane | ug/kg | ND 180 | ND 180 | ND 180 | ND 20 | ND 180 | ND 180 | ND 200 | ND 1300 |
| Aroclor 1016 | ug/kg | ND 360 | ND 360 | ND 370 | ND 40 | ND 3600 | ND 370 | ND 390 | ND 2600 |
| Aroclor 1221 | ug/kg | ND 180 | ND 180 | ND 180 | ND 20 | ND 1800 | ND 180 | ND 200 | ND 1300 |
| Aroclor 1232 | ug/kg | ND 180 | ND 180 | ND 180 | ND 20 | ND 1800 | ND 180 | ND 200 | ND 1300 |
| Aroclor 1242 | ug/kg | ND 180 | ND 180 | ND 180 | ND 20 | ND 1800 | ND 180 | ND 200 | ND 1300 |
| Aroclor 1248 | ug/kg | 1600 J | 1600 J | 1600 J | ND 20 | ND 1800 | ND 20 | ND 200 | ND 1900 |
| Aroclor 1254 | ug/kg | 1300 J | 680 J | 710 J | 190 J | ND 2500 | 1700 J | 1400 | 1400 |
| Aroclor 1260 | ug/kg | ND 21 | ND 18 | ND 1.8 | ND 2 | ND 180 | ND 1.8 | ND 2.0 | ND 130 |
| Dieldrin | ug/kg | ND 0.90 | ND 5.0 | ND 12 | ND 1.2 | ND 89 | ND 3.4 | ND 0.98 | ND 65 |
| gamma-BHC (Lindane) | ug/kg | ND 30 | ND 38 | ND 47 | ND 8.6 | ND 89 | ND 19 | ND 26 | ND 65 |
| gamma-Chlordane | ug/kg | ND 6.5 | ND 2.8 | ND 16 | ND 0.99 | ND 89 | ND 2 | ND 4.6 | ND 65 |
| Heptachlor | ug/kg | | | | | | | | |

Table A.2

Analytical Data
Embankment Beneath Pier 25
Port of Tacoma Industrial Yard
Tacoma, Washington

Page 5 (c)
Date Printed: May 27, 1998
Time Printed: 10:27 am

| <u>Sample Location:</u> | 9A 0-0.3 ft. | 9A 0-1.5 ft. | 9A 1.5-3.0 ft. | 9B ≤-0.3 ft. | 9B 0-1.5 ft. | 9B 1.5-3.0 ft. | 10 -- | 11 -- |
|--------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|
| <u>Sample Depth:</u> | SE-0120 98-JOS-10 01/20/98 | SE-0120 98-JOS-11 01/20/98 | SE-0120 98-JOS-12 01/20/98 | SE-0120 98-JOS-07 01/20/98 | SE-0120 98-JOS-08 01/20/98 | SE-0120 98-JOS-09 01/20/98 | PT-010998-CFD-012 01/09/98 | PT-010998-CFD-010 01/09/98 |
| <u>Sample Id#:</u> | | | | | | | | |
| <u>Sample Date:</u> | | | | | | | | |
| <u>Parameters</u> | | | | | | | | |
| <u>Units</u> | | | | | | | | |
| <u>Volatile Organics</u> | | | | | | | | |
| Ethylbenzene | ND 1.3 | ND 1.1 | ND 1.4 | ND 1.5 | ND 1.2 | ND 1.1 | | |
| n,p-Xylene | ND 2.6 | ND 2.2 | ND 2.7 | ND 2.9 | ND 2.3 | ND 2.2 | | |
| c-Xylene | ND 1.3 | ND 1.1 | ND 1.4 | ND 1.5 | ND 1.2 | ND 1.1 | | |
| Tetrachloroethene | ND 1.3 | ND 1.1 | ND 1.4 | ND 1.5 | ND 1.2 | ND 1.1 | | |
| Trichloroethene | ND 1.3 | 3.4 | 7.2 | ND 1.4 | ND 1.5 | ND 1.5 | | |

Table A.2

Analytical Data
Embankment Beneath Pier 25
Port of Tacoma Industrial Yard
Tacoma, Washington

Pag: 6 (a)
Date Printed: May 27, 1998
Time Printed: 10:27 am

| Parameters | Units | 1/A 0-0.3 ft. | 1/A 0-1.5 ft. | 1/A 1.5-3.0 ft. | 1/B 0-0.3 ft. | 1/B 0-1.5 ft. | 1/B 0-1.5 ft. | 1/B 0-1.5 ft. | 1/B 0-1.5 ft. |
|----------------------------|-------|-------------------|-------------------|--------------------|-------------------|-------------------|-------------------|-------------------|-------------------|
| Sample Location: | | | | | | | | | |
| Sample Depth: | | | | | | | | | |
| Sample Id: | | SE-0120 98-JOS-01 | SE-0120 98-JOS-02 | SE-0120 98-JOS-03 | SE-0120 98-JOS-04 | SE-0120 98-JOS-05 | SE-0120 98-JOS-06 | SE-0120 98-JOS-07 | SE-0120 98-JOS-08 |
| Sample Date: | | 01/20/98 | 01/20/98 | 01/20/98 | 01/20/98 | 01/20/98 | 01/20/98 | 01/20/98 | 01/20/98 |
| Acid Extractables | ug/kg | ND 39 | ND 83 | ND 87 | ND 74 | ND 40 | ND 39 | ND 39 | ND 20 |
| 2,4-Dimethylphenol | ug/kg | ND 39 | ND 83 | ND 87 | ND 74 | ND 40 | ND 39 | ND 35 | ND 20 |
| 2-Methylphenol | ug/kg | ND 39 | ND 83 | ND 87 | ND 74 | ND 40 | ND 35 | ND 35 | ND 20 |
| 2-Methylphenol | ug/kg | ND 190 | ND 420 | ND 430 | ND 370 | ND 200 | ND 190 | ND 190 | ND 99 |
| Penachlorophenol | ug/kg | | | | | | | | |
| Phenol | ug/kg | 55 J | ND 83 | ND 87 | ND 74 | ND 40 | ND 35 | ND 35 | ND 20 |
| Semi-volatile Organics | | | | | | | | | |
| 1,2,4-Trichlorobenzene | ug/kg | ND 39 | ND 83 | ND 87 | ND 74 | ND 40 | ND 39 | ND 39 | ND 20 |
| 1,2-Dichlorobenzene | ug/kg | ND 39 | ND 83 | ND 87 | ND 74 | ND 40 | ND 39 | ND 39 | ND 20 |
| 1,3-Dichlorobenzene | ug/kg | ND 39 | ND 83 | ND 87 | ND 74 | ND 40 | ND 39 | ND 39 | ND 20 |
| 1,4-Dichlorobenzene | ug/kg | 68 J | 130 J | ND 87 | ND 74 | ND 40 | ND 39 | ND 39 | ND 20 |
| 2-Methylnaphthalene | ug/kg | 220 J | 220 J | 110 J | 86 J | 360 J | 110 J | 110 J | 48 |
| Acenaphthene | ug/kg | 96 J | ND 83 | ND 87 | 160 J | 630 J | 210 J | 210 J | 73 |
| Acenaphthylene | ug/kg | 730 J | 730 J | 490 J | 110 J | 140 J | 54 J | 54 J | 36 |
| Anthracene | ug/kg | 1400 J | 2800 J | 1300 J | 1700 J | 1700 J | 650 J | 650 J | 270 |
| benzo(a)Anthracene | ug/kg | 2400 J | 3400 J | 1900 J | 2700 J | 4600 J | 1200 J | 1200 J | 450 J |
| benzo(a)Pyrene | ug/kg | 2300 J | 4300 J | 1900 J | 2600 J | 5200 J | 1800 J | 1800 J | 480 J |
| benzo(b)Fluoranthene | ug/kg | 650 J | 1300 J | 1900 J | 2700 J | 6100 J | 2300 J | 2300 J | 520 J |
| benzo(g,h,i)Perylene | ug/kg | 2100 J | 3300 J | 2200 J | 3200 J | 3900 J | 1800 J | 1800 J | 400 J |
| benzo(k)Fluoranthene | ug/kg | 980 J | 2000 J | 1500 J | 1000 J | 510 J | 670 J | 670 J | 310 J |
| bis(2-ethylhexyl)Phthalate | ug/kg | ND 39 | ND 420 | ND 87 | ND 74 | ND 40 | ND 39 | ND 39 | ND 20 |
| Butylbenzylphthalate | ug/kg | 2600 J | 5800 J | 2600 J | 3700 J | 3200 J | 1800 J | 1800 J | 650 J |
| Chrysene | ug/kg | ND 39 | ND 83 | ND 83 | ND 87 | ND 74 | ND 40 | ND 39 | ND 39 |
| di-N-Butylphthalate | ug/kg | ND 39 | ND 420 | ND 87 | ND 74 | ND 40 | ND 39 | ND 39 | ND 20 |
| di-N-Octyl phthalate | ug/kg | 580 J | 760 J | 590 J | 600 J | 1100 J | 310 J | 310 J | 230 J |
| dibenz(a,h)Anthracene | ug/kg | 180 J | 230 J | 110 J | 190 J | 590 J | 170 J | 170 J | 24 |
| Dibenzofuran | ug/kg | ND 39 | ND 83 | ND 87 | ND 74 | ND 40 | ND 39 | ND 39 | ND 20 |
| Dieethylphthalate | ug/kg | 63 J | ND 83 | ND 83 | ND 87 | ND 74 | ND 40 | ND 39 | ND 39 |
| Dimethylphthalate | ug/kg | 2500 J | 1500 J | 1000 J | 14000 J | 5100 J | 2100 J | 2100 J | 620 |
| Fluoranthene | ug/kg | 270 J | 230 J | 130 J | 330 J | 640 J | 210 J | 210 J | 94 |
| Fluorene | ug/kg | ND 39 | 86 J | 91 J | ND 74 | 40 J | ND 39 | ND 39 | ND 20 |
| Hexachlorobezene | ug/kg | ND 39 | ND 83 | ND 87 | ND 74 | 72 J | 71 J | 71 J | ND 20 |
| Hexachlorobutadiene | ug/kg | ND 39 | ND 83 | ND 87 | ND 74 | ND 40 | ND 39 | ND 39 | ND 20 |
| Hexachloroethane | ug/kg | 1000 J | 1600 J | 960 J | 1100 J | 2300 J | 800 J | 800 J | 400 J |
| Indeno(1,2,3-cd)Pyrene | ug/kg | | | | | | | | |

Table A.2

Analytical Data
Embankment: Beneath Pier 25
Port of Tacoma Industrial Yard
Tacoma, Washington

Page: 6 (b)

Date Printed: May 27, 1998

Time Printed: 10:27 am

| Parameters | Units | 1/A 0-0.3 ft. | 1/A 0-1.5 ft. | 1/A 1.5-3.0 ft. | 1/B 0-0.3 ft. | 1/B 0-1.5 ft. | 1/B 1.5-3.0 ft. | 1/B SE-0120 98-JOS-05 | 1/B SE-0120 98-JOS-06 | 1/B SE-0120 98-JOS-07 | 1/B 01/20/98 | 1/B 01/20/98 | 1/B 01/20/98 |
|---------------------------------|-------|------------------|------------------|--------------------|------------------|------------------|--------------------|--------------------------|--------------------------|--------------------------|-----------------|-----------------|-----------------|
| Semi-volatile Organics (Cont'd) | ug/kg | ND 39 | ND 83 | ND 87 | ND 74 | ND 40 | ND 35 | ND 20 | ND 35 | ND 20 | ND 35 | ND 35 | ND 35 |
| N-Nitrosodiphenylamine | ug/kg | 89 J | 300 J | 170 J | 130 J | 1200 J | 330 J | 35 | 35 | 35 | 35 | 35 | 35 |
| Naphthalene | ug/kg | 1300 J | 1300 J | 640 J | 1700 J | 2200 J | 1100 J | 700 | 700 | 700 | 700 | 700 | 700 |
| Phenanthrene | ug/kg | 3800 J | 16000 J | 6500 J | 7100 J | 13000 J | 6000 J | 10000 J | 10000 J | 10000 J | 10000 J | 10000 J | 10000 J |
| Pyrene | ug/kg | | | | | | | | | | | | |
| Metals | mg/kg | | | | | | | | | | | | |
| Antimony | mg/kg | 1.3 J | 12 J | 24 J | R | 1.8 J | 1.4 J | 8.4 J | 8.4 J | 8.4 J | 8.4 J | 8.4 J | 8.4 J |
| Arsenic | mg/kg | 45 J | 74 J | 62 J | 38 J | 41 J | 41 J | 64 J | 64 J | 64 J | 64 J | 64 J | 64 J |
| Cadmium | mg/kg | 0.57 J | 6.0 J | 3.1 J | 0.4 J | 1.4 J | 1.4 J | 1.3 J | 1.3 J | 1.3 J | 1.3 J | 1.3 J | 1.3 J |
| Chromium | mg/kg | 53 J | 250 J | 120 J | 29 J | 40 J | 46 J | 170 J | 170 J | 170 J | 170 J | 170 J | 170 J |
| Copper | mg/kg | 180 J | 220 J | 250 J | 130 J | 160 J | 170 J | 1000 J | 1000 J | 1000 J | 1000 J | 1000 J | 1000 J |
| Lead | mg/kg | 130 J | 1200 J | 990 J | 52 J | 240 J | 220 J | 520 J | 520 J | 520 J | 520 J | 520 J | 520 J |
| Mercury | mg/kg | 0.26 J | 1.4 J | 1.4 J | 0.26 J | 0.71 J | 0.58 J | 0.30 J | 0.30 J | 0.30 J | 0.30 J | 0.30 J | 0.30 J |
| Nickel | mg/kg | 27 J | 77 J | 76 J | 21 J | 37 J | 36 J | 74 J | 74 J | 74 J | 74 J | 74 J | 74 J |
| Silver | mg/kg | 0.32 J | 1.1 J | 1.1 J | 0.27 J | 0.7 J | 0.7 J | 6.9 J | 6.9 J | 6.9 J | 6.9 J | 6.9 J | 6.9 J |
| Zinc | mg/kg | 300 J | 1100 J | 1500 J | 150 J | 360 J | 360 J | | | | | | |
| Pesticides/PCBs | ug/kg | | | | | | | | | | | | |
| 4,4'-DDD | ug/kg | 13 J | 37 J | 87 J | ND 6.5 | ND 42 | 37 J | ND 7.9 | ND 7.9 | ND 7.9 | ND 7.9 | ND 7.9 | ND 7.9 |
| 4,4'-DDE | ug/kg | ND 5.3 | ND 33 | ND 20 | ND 5.5 | ND 22 | ND 22 | ND 22 | ND 22 | ND 22 | ND 22 | ND 22 | ND 22 |
| 4,4'-DDT | ug/kg | ND 1.9 | ND 34 | ND 39 | ND 1.9 | ND 28 | ND 28 | ND 28 | ND 28 | ND 28 | ND 28 | ND 28 | ND 28 |
| Aldrin | ug/kg | ND 1.4 | ND 12 | ND 45 | ND 1.2 | ND 20 | ND 20 | ND 20 | ND 20 | ND 20 | ND 20 | ND 20 | ND 20 |
| alpha-Chlordane | ug/kg | ND 0.97 | ND 0.95 | ND 24 | ND 0.93 | ND 0.93 | ND 0.93 | ND 0.93 | ND 0.93 | ND 0.93 | ND 0.93 | ND 0.93 | ND 0.93 |
| Aroclor 016 | ug/kg | ND 39 | ND 190 | ND 200 | ND 19 | ND 200 | ND 19 | ND 93 | ND 93 | ND 93 | ND 93 | ND 93 | ND 93 |
| Aroclor 1211 | ug/kg | ND 77 | ND 380 | ND 390 | ND 37 | ND 400 | ND 37 | ND 190 | ND 190 | ND 190 | ND 190 | ND 190 | ND 190 |
| Aroclor 1232 | ug/kg | ND 39 | ND 190 | ND 200 | ND 19 | ND 200 | ND 19 | ND 93 | ND 93 | ND 93 | ND 93 | ND 93 | ND 93 |
| Aroclor 1242 | ug/kg | ND 39 | ND 190 | ND 200 | ND 19 | ND 200 | ND 19 | ND 93 | ND 93 | ND 93 | ND 93 | ND 93 | ND 93 |
| Aroclor 1248 | ug/kg | ND 39 | ND 190 | ND 200 | ND 19 | ND 200 | ND 19 | ND 93 | ND 93 | ND 93 | ND 93 | ND 93 | ND 93 |
| Aroclor 1254 | ug/kg | 680 J | 1300 J | 1000 J | ND 19 | ND 19 | 610 J | 610 J | 610 J | 610 J | 610 J | 610 J | 610 J |
| Aroclor 1260 | ug/kg | 340 J | 1200 J | 1000 J | ND 23 | ND 23 | 670 J | 670 J | 670 J | 670 J | 670 J | 670 J | 670 J |
| Dieldrin | ug/kg | ND 1.9 | ND 9.3 | ND 11 | ND 1.9 | ND 10 | ND 10 | ND 10 | ND 10 | ND 10 | ND 10 | ND 10 | ND 10 |
| gamma-BHC (Lindane) | ug/kg | ND 0.97 | ND 5.6 | ND 11 | ND 0.93 | ND 93 | ND 93 | ND 93 | ND 93 | ND 93 | ND 93 | ND 93 | ND 93 |
| gamma-Chlordane | ug/kg | ND 11 | ND 38 | ND 54 | ND 6.7 | ND 32 | ND 32 | ND 32 | ND 32 | ND 32 | ND 32 | ND 32 | ND 32 |
| Hepachlor | ug/kg | ND 0.97 | ND 14 | ND 9.3 | ND 8.8 | ND 8.8 | ND 8.8 | ND 8.8 | ND 8.8 | ND 8.8 | ND 8.8 | ND 8.8 | ND 8.8 |

Table A.2

Analytical Data
Embankment Beneath Pier 25
Port of Tacoma Industrial Yard
Tacoma, Washington

Page 6 (c)
Date Printed: May 27, 1998
Time Printed: 10:27 am

| <u>Parameters</u> | <u>Units</u> | 11A 0-0.3 ft. | 11A 0-1.5 ft. | 11A 1.5-3.0 ft. | 11B 0-0.3 ft. | 11B 0-1.5 ft. | 11B 1.5-3.0 ft. | 11B SE-0120 98-JOS-05 | 11B SE-0120 98-JOS-06 | 11B SE-0120 98-JOS-06 |
|-------------------|--------------|-------------------|-------------------|--------------------|-------------------|-------------------|--------------------|--------------------------|--------------------------|--------------------------|
| Sample Location: | | SE-0120 98-JOS-01 | SE-0120 98-JOS-02 | SE-0120 98-JOS-03 | SE-0120 98-JOS-04 | SE-0120 98-JOS-05 | SE-0120 98-JOS-06 | PT-010998-CFD-013 | PT-010998-CFD-013 | PT-010998-CFD-013 |
| Sample Depth: | | 01/20/98 | 01/23/98 | 01/20/98 | 01/20/98 | 01/20/98 | 01/20/98 | 01/20/98 | 01/20/98 | 01/20/98 |
| Sample Id: | | | | | | | | | | |
| Sample Date: | | | | | | | | | | |
| | | | | | | | | | | |

| Volatile Organics | |
|-------------------|-------|
| Ethylbenzene | ug/kg |
| n,p-Xylene | ug/kg |
| o-Xylene | ug/kg |
| Tetrachloroethene | ug/kg |
| Trichloroethene | ug/kg |

| Parameter | Unit | 11A | 11A | 11A | 11B | 11B | 11B | 11B | 11B | 11B |
|-------------------|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| Ethylbenzene | ug/kg | ND 1.6 | ND 1.4 | ND 1.7 | ND 2.8 |
| n,p-Xylene | ug/kg | ND 3.2 | ND 2.7 | ND 3.5 | ND 1.4 |
| o-Xylene | ug/kg | ND 1.6 | ND 1.4 | ND 1.7 | ND 1.4 |
| Tetrachloroethene | ug/kg | ND 1.6 | ND 1.4 | ND 1.7 | ND 1.4 |
| Trichloroethene | ug/kg | ND 1.6 | 4.4 J | 3.0 J | ND 1.4 |

Notes

| | | |
|-------|---|-------------------------------------|
| J | - | Estimated. |
| R | - | Rejected. |
| NDx | - | Not detected at the associated PQL. |
| ug/kg | - | micrograms per kilograms. |
| mg/kg | - | milligrams per kilograms. |

TABLE A.3

ANALYTICAL METHODS, SAMPLE PRESERVATION, AND HOLDING TIME CRITERIA
 EMBANKMENT BENEATH PIER 25
 PORT OF TACOMA INDUSTRIAL YARD
 TACOMA, WASHINGTON

| <i>Analyses</i> | <i>Analytical Method (1)</i> | <i>Preservation</i> | <i>Maximum Holding Time</i> |
|--|------------------------------|---------------------|--|
| VOCs | 8260 | Cool 4°C | 14 days from collection to analysis |
| SVOCS | 8270 | Cool 4°C | 14 days from collection to preparatory extraction 40 days from preparatory extraction to analysis |
| Pesticides/PCBs | 8081 | Cool 4°C | 14 days from collection to preparatory extraction 40 days from preparatory extraction to analysis |
| Chromium, Copper, Lead, Nickel, Zinc | 6010 | Cool 4°C | 6 months from collection to analysis |
| Antimony, Arsenic, Cadmium, Lead, Silver | 7041/7060/7131/7421/7761 | Cool 4°C | 6 months from collection to analysis |
| Mercury | 7471 | Cool 4°C | 28 days from collection to analysis |

Notes:

- (1) "Test Methods for Evaluating Solid Waste - Physical/Chemical Methods", SW-846, 3rd Edition, 1986 (with revisions).
- PCBs Polychlorinated Biphenyl.
- SVOCS Semi-Volatile Organic Compound.
- VOCs Volatile Organic Compound.

TABLE A.4

QUALIFIED SAMPLE RESULTS DUE TO OUTLYING CONTINUING CALIBRATION RESULTS
 EMBANKMENT BENEATH PIER 25
 PORT OF TACOMA INDUSTRIAL YARD
 TACOMA, WASHINGTON

| <i>Parameter</i> | <i>Calibration Date</i> | <i>Compound</i> | <i>%D</i> | <i>Associated Sample ID</i> | <i>Sample Results</i> | <i>Units</i> | <i>Qualifier</i> |
|------------------|-------------------------|------------------------|-----------|-----------------------------|-----------------------|--|------------------|
| Semi-Volatiles | 02/09/98 | Indeno(1,2,3-cd)pyrene | 27 | 9B (0-0.3) 9A (0-1.5) | 2500 320 | $\mu\text{g}/\text{Kg}$ $\mu\text{g}/\text{Kg}$ | J J |
| | 01/27/98 | Dibenzo(a,h)anthracene | 33 | 11B (0-1.5) | 1100 | $\mu\text{g}/\text{Kg}$ | J |
| Pesticides | 01/31/98 | 4,4-DDD | 25 | 7 (0-0.33) | 3.9 | $\mu\text{g}/\text{Kg}$ | J |

Notes
 %D Percent Difference.
 J Estimated.

TABLE A.5
QUALIFIED SAMPLE RESULTS DUE TO OUTLYING INTERNAL STANDARD RECOVERIES
EMBANKMENT BEATH PIER 25
PORT OF TACOMA INDUSTRIAL YARD
TACOMA, WASHINGTON

| Parameter | Sample ID | IS Recovery (percent) | Control Limits (percent) | Analytes | Sample Results | Units | Qualifier | |
|----------------|-------------|-----------------------|--------------------------|----------|---|---------------------------------------|--|----------------------------|
| Semi-Volatiles | 7 (0-0.33) | Perylene-d12 | 33 | 50-200 | Benzo(b)fluoranthene Benzo(k)fluoranthene Benzo(a)pyrene Indeno(1,2,3-cd)pyrene Dibenz(a,h)anthracene Benzo(g,h,i)perylene | 440 310 310 160 63 150 | $\mu\text{g}/\text{Kg}$ $\mu\text{g}/\text{Kg}$ $\mu\text{g}/\text{Kg}$ $\mu\text{g}/\text{Kg}$ $\mu\text{g}/\text{Kg}$ $\mu\text{g}/\text{Kg}$ | J J J J J J |
| | 9 (0-0.33) | Chrysene-d12 | 33 | 50-200 | Pyrene Benzo(a)anthracene bis(2-Etihexyl)phthalate Chrysene | 1400 600 380 1100 | $\mu\text{g}/\text{Kg}$ $\mu\text{g}/\text{Kg}$ $\mu\text{g}/\text{Kg}$ $\mu\text{g}/\text{Kg}$ | J J J J |
| | 12 (0-0.33) | Chrysene-d12 | 46 | 50-200 | Pyrene Benzo(a)anthracene bis(2-Etihexyl)phthalate Chrysene | 1000 450 310 650 | $\mu\text{g}/\text{Kg}$ $\mu\text{g}/\text{Kg}$ $\mu\text{g}/\text{Kg}$ $\mu\text{g}/\text{Kg}$ | J J J J |

TABLE A.5

QUALIFIED SAMPLE RESULTS DUE TO OUTLYING INTERNAL STANDARD RECOVERIES
 EMBANKMENT BEneath PIER 25
 PORT OF TACOMA INDUSTRIAL YARD
 TACOMA, WASHINGTON

| Parameter | Sample ID | IS | IS Recovery (percent) | Control Limits (percent) | Analytes | Sample Results | Units | Qualifier |
|----------------|--------------|--------------|-----------------------|--------------------------|--|---|-------|-----------|
| | Perylene-d12 | | 37 | 50-200 | Benzo(b)fluoranthene Benzo(k)fluoranthene Benzo(a)pyrene Indero(1,2,3-cd)pyrene Dibenz(a,h)anthracene Benzo(g,h,l)perylene Benzo(b)fluoranthene Benzo(k)fluoranthene Benzo(a)pyrene Indero(1,2,3-cd)pyrene Dibenz(a,h)anthracene Benzo(g,h,l)perylene | 520 400 480 400 230 610 1600 1700 1500 760 390 530 | µg/Kg | J |
| Semi-Volatiles | 5B (1.5-3.0) | Perylene-d12 | 44 | 50-200 | | | µg/Kg | J |

Notes:

IS Internal Standard.
 J Estimated.

TABLE A.6

QUALIFIED SAMPLE RESULTS DUE TO OUTLYING SURROGATE RECOVERIES
 EMBANKMENT BENEATH PIER 25
 PORT OF TACOMA INDUSTRIAL YARD
 TACOMA, WASHINGTON

| <i>Parameter</i> | <i>Sample ID</i> | <i>Surrogate</i> | <i>Surrogate Recovery (percent)</i> | <i>Control Limits (percent)</i> | <i>Analytes</i> | <i>Sample Results</i> | <i>Units</i> | <i>Qualifier</i> |
|------------------|------------------|------------------------|-------------------------------------|---------------------------------|---|-----------------------|---|------------------|
| Volatiles | 1A (1.5-3.0) | 1,2-Dichlorobenzene-d4 | 16 | 85-115 | Ethylbenzene m/p-Xylene o-Xylene | 280 400 170 | $\mu\text{g}/\text{Kg}$ $\mu\text{g}/\text{Kg}$ $\mu\text{g}/\text{Kg}$ | J J J |
| Pesticides | 1 (0-0.5) | TCMX DCB | 1 1 | 30-150 30-150 | Aroclor 1260 | 120 | $\mu\text{g}/\text{Kg}$ | J |
| | 5 (0-0.42) | DCB | 1 | 30-150 | Aroclor 1260 | 170 | $\mu\text{g}/\text{Kg}$ | J |
| | 9 (0-0.33) | TCMX DCB | 1 1 | 30-150 30-150 | 4,4-DDD Aroclor 1254 Aroclor 1260 | 88 680 960 | $\mu\text{g}/\text{Kg}$ $\mu\text{g}/\text{Kg}$ $\mu\text{g}/\text{Kg}$ | J J J |
| | 3 (0-0.33) | TCMX DCB | 1 1 | 30-150 30-150 | Aroclor 1260 | 840 | $\mu\text{g}/\text{Kg}$ | J |
| | 3 (0-0.33) Dup | TCMX DCB | 1 1 | 30-150 30-150 | Aroclor 1260 | 950 | $\mu\text{g}/\text{Kg}$ | J |
| | 2 (0-0.5) | TCMX DCB | 1 1 | 30-150 30-150 | Aroclor 1260 | 470 | $\mu\text{g}/\text{Kg}$ | J |
| | 10 (0-0.33) | DCB | 1 | 30-150 | Aroclor 1260 | 1700 | $\mu\text{g}/\text{Kg}$ | J |
| | 12 (0-0.33) | DCB | 199 | 30-150 | Aroclor 1260 | 990 | $\mu\text{g}/\text{Kg}$ | J |



TABLE A.6
QUALIFIED SAMPLE RESULTS DUE TO OUTLYING SURROGATE RECOVERIES
EMBANKMENT BENEATH PIER 25
PORT OF TACOMA INDUSTRIAL YARD
TACOMA, WASHINGTON

| <i>Parameter</i> | <i>Sample ID</i> | <i>Surrogate</i> | <i>Surrogate Recovery (percent)</i> | <i>Control Limits (percent)</i> | <i>Analytes</i> | <i>Sample Results</i> | <i>Units</i> | <i>Qualifier</i> |
|------------------|------------------|------------------|-------------------------------------|---------------------------------|--|-----------------------|---|------------------|
| Pesticides | 6 (0-0.33) | DCB | 1 | 30-150 | Aroclor 1260 | 710 | $\mu\text{g}/\text{Kg}$ | J |
| | 11A (0-0.3) | DCB | 1 | 30-150 | Aroclor 1260 | 340 | $\mu\text{g}/\text{Kg}$ | J |
| | 11A (0-1.5) | TCMX DCB | 1 1 | 30-150 30-150 | 4,4'-DDD Aroclor 1254 Aroclor 1260 | 37 680 1200 | $\mu\text{g}/\text{Kg}$ $\mu\text{g}/\text{Kg}$ $\mu\text{g}/\text{Kg}$ | J J J |
| | 11A (1.5-3.0) | TCMX DCB | 1 1 | 30-150 30-150 | 4,4'-DDD Aroclor 1254 Aroclor 1260 | 87 1300 1000 | $\mu\text{g}/\text{Kg}$ $\mu\text{g}/\text{Kg}$ $\mu\text{g}/\text{Kg}$ | J J J |
| | 11B (0-1.5) | TCMX DCB | 1 1 | 30-150 30-150 | Aroclor 1254 Aroclor 1260 | 640 670 | $\mu\text{g}/\text{Kg}$ $\mu\text{g}/\text{Kg}$ | J J |
| | 11B (1.5-3.0) | TCMX DCB | 1 1 | 30-150 30-150 | 4,4'-DDD Aroclor 1254 Aroclor 1260 | 37 610 530 | $\mu\text{g}/\text{Kg}$ $\mu\text{g}/\text{Kg}$ $\mu\text{g}/\text{Kg}$ | J J J |
| | 9B (1.5-3.0) | TCMX DCB | 1 1 | 30-150 30-150 | 4,4'-DDD Aroclor 1254 Aroclor 1260 | 15 430 920 | $\mu\text{g}/\text{Kg}$ $\mu\text{g}/\text{Kg}$ $\mu\text{g}/\text{Kg}$ | J J J |
| | 9A (0-0.3) | TCMX DCB | 1 1 | 30-150 30-150 | 4,4'-DDD Aroclor 1254 Aroclor 1260 | 22 1600 1300 | $\mu\text{g}/\text{Kg}$ $\mu\text{g}/\text{Kg}$ $\mu\text{g}/\text{Kg}$ | J J J |

TABLE A.6

QUALIFIED SAMPLE RESULTS DUE TO OUTLYING SURROGATE RECOVERIES
 EMBANKMENT BEneath PIER 25
 PORT OF TACOMA INDUSTRIAL YARD
 TACOMA, WASHINGTON

| <i>Parameter</i> | <i>Sample ID</i> | <i>Surrogate</i> | <i>Surrogate Recovery (percent)</i> | <i>Control Limits (percent)</i> | <i>Analytes</i> | <i>Sample Results</i> | <i>Units</i> | <i>Qualifier</i> |
|------------------|------------------|------------------|-------------------------------------|---------------------------------|--|-----------------------|-------------------------|------------------|
| Pesticides | 9A (0-1.5) | TCMX DCB | 1 1 | 30-150 30-150 | 4,4'-DDD Aroclor 1254 Aroclor 1260 | 71 940 680 | µg/Kg µg/Kg µg/Kg | J J J |
| | 9A (1.5-3.0) | TCMX DCB | 1 1 | 30-150 30-150 | 4,4'-DDD Aroclor 1254 Aroclor 1260 | 92 1000 710 | µg/Kg µg/Kg µg/Kg | J J J |
| | 7A (0-1.5) | TCMX DCB | 1 1 | 30-150 30-150 | 4,4'-DDD Aroclor 1254 Aroclor 1260 | 29 1400 2600 | µg/Kg µg/Kg µg/Kg | J J J |
| | 7A (1.5-3.0) Dup | TCMX DCB | 1 1 | 30-150 30-150 | 4,4'-DDD Aroclor 1254 Aroclor 1260 | 22 740 900 | µg/Kg µg/Kg µg/Kg | J J J |
| | 7B (0-0.3) | TCMX DCB | 1 1 | 30-150 30-150 | 4,4'-DDD Aroclor 1260 | 18 370 | µg/Kg µg/Kg | J J |
| | 7B (0-1.5) | TCMX DCB | 1 1 | 30-150 30-150 | 4,4'-DDD Aroclor 1254 Aroclor 1260 | 17 550 920 | µg/Kg µg/Kg µg/Kg | J J J |
| | 7B (1.5-3.0) | TCMX DCB | 1 1 | 30-150 30-150 | Aroclor 1254 Aroclor 1260 | 1100 820 | µg/Kg µg/Kg | J J |

TABLE A.6
QUALIFIED SAMPLE RESULTS DUE TO OUTLYING SURROGATE RECOVERIES
EMBANKMENT BENEATH PIER²⁵
PORT OF TACOMA INDUSTRIAL YARD
TACOMA, WASHINGTON

| Parameter | Sample ID | Surrogate | Surrogate Recovery (percent) | Control Limits (percent) | Analytes | Sample Results | Units | Qualifier |
|------------|--------------|-------------|------------------------------|--------------------------|--|------------------|-------------------------|-------------|
| Pesticides | 5A (0-0.3) | TCMX DCB | 1 1 | 30-150 30-150 | 4,4'-DDD Aroclor 1254 Aroclor 1260 | 14 180 280 | µg/Kg µg/Kg µg/Kg | J J J |
| | 5B (0-1.5) | TCMX DCB | 1 1 | 30-150 30-150 | Aroclor 1254 Aroclor 1260 | 1100 860 | µg/Kg µg/Kg | J J |
| | 5B (1.5-3.0) | TCMX DCB | 1 1 | 30-150 30-150 | Aroclor 1254 Aroclor 1260 | 1100 930 | µg/Kg µg/Kg | J J |
| | 3A (0-0.3) | TCMX DCB | 1 1 | 30-150 30-150 | Aroclor 1250 | 180 | µg/Kg | J |
| | 3A (0-1.5) | TCMX DCB | 1 1 | 30-150 30-150 | Aroclor 1254 Aroclor 1260 | 430 500 | µg/Kg µg/Kg | J J |
| | 3A (1.5-3.0) | TCMX DCB | 1 1 | 30-150 30-150 | 4,4'-DDD Aroclor 1254 Aroclor 1260 | 20 370 530 | µg/Kg µg/Kg µg/Kg | J J J |
| | 3B (0-1.5) | TCMX DCB | 1 1 | 30-150 30-150 | Aroclor 1254 Aroclor 1260 | 1100 840 | µg/Kg µg/Kg | J J |
| | 3B (1.5-3.0) | TCMX DCB | 1 1 | 30-150 30-150 | Aroclor 1254 Aroclor 1260 | 2500 1200 | µg/Kg µg/Kg | J J |

TABLE A.6

QUALIFIED SAMPLE RESULTS DUE TO OUTLYING SURROGATE RECOVERIES
 EMBANKMENT BENEATH PIER 25
 PORT OF TACOMA INDUSTRIAL YARD
 TACOMA, WASHINGTON

| <i>Parameter</i> | <i>Sample ID</i> | <i>Surrogate</i> | <i>Surrogate Recovery (percent)</i> | <i>Control Limits (percent)</i> | <i>Analytes</i> | <i>Sample Results</i> | <i>Units</i> | <i>Qualifier</i> |
|------------------|------------------|------------------|-------------------------------------|---------------------------------|-----------------|-----------------------|-------------------------|------------------|
| Pesticides | 1A (0-0.3) | TCMX DCB | 1 1 | 30-150 30-150 | Aroclor 1260 | 240 | $\mu\text{g}/\text{Kg}$ | J |
| | 9B (0-0.3) | DCB | 1 | 30-150 | Aroclor 1260 | 190 | $\mu\text{g}/\text{Kg}$ | J |
| | 7A (0-0.3) | DCB | 1 | 30-150 | Aroclor 1260 | 460 | $\mu\text{g}/\text{Kg}$ | J |
| | 5B (0-0.3) | DCB | 1 | 30-150 | Aroclor 1260 | 120 | $\mu\text{g}/\text{Kg}$ | J |
| | 3A (0-0.3) Dup | TCMX DCB | 152 1 | 30-150 30-150 | Aroclor 1254 | 180 | $\mu\text{g}/\text{Kg}$ | J |

Notes:
 DCB Decachlorobiphenyl.
 Dup Field Duplicate.
 I No recovery reported due to matrix interference.
 J Estimated.
 TCMX Tetra-chloro-m-xylene.

TABLE A.7

QUALIFIED SAMPLE RESULTS DUE TO ANALYTE CONCENTRATIONS IN THE METHOD BLANKS
 EMBANKMENT BEING UNDER PIER 25
 PORT OF TACOMA INDUSTRIAL YARD
 TACOMA, WASHINGTON

| <i>Parameter</i> | <i>Blank ID/ Date</i> | <i>Analyte</i> | <i>Blank Results (1)</i> | <i>Sample ID</i> | <i>Sample Results</i> | <i>Qualified Sample Results</i> | <i>Units</i> |
|------------------|---------------------------|----------------------------|------------------------------|------------------|---------------------------|---|-------------------------|
| Semi-Volatiles | V033MBS | Bis(2-ethylhexyl)phthalate | 23 | 1 (0-0.5) | 190 | ND 190 | $\mu\text{g}/\text{Kg}$ |
| | | | 23 | 7 (0-0.33) | 200 | ND 200 | $\mu\text{g}/\text{Kg}$ |
| | | | 50 | 8 (0-0.33) | 470 | ND 470 | $\mu\text{g}/\text{Kg}$ |
| Metals | MB4 1/23/98 | Antimony | 0.13 | 11B (0-0.3) | 0.3 | ND 0.3 | mg/Kg |
| | | | 0.12 | 7B (0-0.3) | 0.29 | ND 0.29 | mg/Kg |
| | | | 0.19 | 5A (0-1.0) | 0.4 | ND 0.4 | mg/Kg |
| | | | 0.23 | 5A (1.0-3.0) | 0.3 | ND 0.3 | mg/Kg |
| | | | 0.14 | 5B (0-0.3) | 0.3 | ND 0.3 | mg/Kg |
| | | | 0.14 | 3B (0-0.3) | 0.2 | ND 0.2 | mg/Kg |
| | | | 0.38 | 1A (1.5-3.0) | 0.7 | ND 0.7 | mg/Kg |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |

Notes:

- (1) Blank results have been corrected to reflect the individual sample dry weights.
 NDx Not detected at or above x.

TABLE A.8
QUALIFIED SAMPLE RESULTS DUE TO OUTLYING MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERIES
EMBANKMENT BEneath PIER 25
PORT OF TACOMA INDUSTRIAL YARD
TACOMA, WASHINGTON

| Parameter | Sample ID | Analyte | MS Recovery (percent) | MSD Recovery (percent) | RPD | Recovery Control Limits (percent) | Associated Sample ID | Sample Results | Units | Qualifier |
|---------------|---|---|--------------------------------|----------------------------------|-----------------------------|--|----------------------------|--|--------------------------------------|---|
| Volatiles | 5B (1.5-3.0) | Ethylbenzene m/p-Xylene o-Xylene | 74 70 68 | 96 91 92 | 26 27 30 | 70-130 70-130 70-130 | 20 20 20 | 5B(1.5-3.0) 5B(1.5-3.0) 5B(1.5-3.0) | 12 11 8.9 | J J J |
| | 1A (1.5-3.0) | Tetrachloroethene | 190 | 168 | 12 | 70-130 | 20 | 1A(1.5-3.0) | 36000 | μg/Kg |
| | 7 (0-0.33) | Fluoranthene Pyrene | 165 241 | 179 195 | 3 21 | 50-150 35-142 | 50 36 | 7(0-0.33) 7(0-0.33) | 38C 54C | μg/Kg μg/Kg |
| Semi-Voatiles | 3A (0-1.5) | Naphthalene bis(2-ethylhexyl)phthalate Benzo(a)anthracene Chrysene Benzo(k)fluoranthene | 30 137 236 337 296 | 125 5303 171 210 317 | 120 120 32 46 7 | 45-120 50-150 50-150 50-150 50-150 | 40 50 50 50 50 | 3A (0-1.5) 3A (0-1.5) 3A (0-1.5) 3A (0-1.5) 3A (0-1.5) | 1500 1300 1600 2300 3000 | μg/Kg μg/Kg μg/Kg μg/Kg μg/Kg |
| | 5B (1.5-3.0) | Benzo(b)fluoranthene | 153 | 171 | 11 | 50-150 | 50 | 5B(1.5-3.0) | 1600 | μg/Kg |
| 3B (0-1.5) | Fluorene | 28 | 37 | 25 | 50-150 | 50 | 3B (0-1.5) | 930 | μg/Kg | |
| | di-N-octylphthalate benzo(g,h,i)perylene | 38 36 | 34 17 | 11 70 | 50-150 50-150 | 50 50 | 3B (0-1.5) 3B (0-1.5) | 160 600 | μg/Kg μg/Kg | |
| | Benzo(a)pyrene | 27 | 89 | 10 | 50-150 | 50 | 3B (0-1.5) | 1400 | μg/Kg | |
| | Fluoranthene | 122 | 61 | 67 | 50-150 | 50 | 3B (0-1.5) | 3300 | μg/Kg | |

Notes:

J Estimate.

MS Matrix Spike.

MSD Matrix Spike Duplicate.

RPD Relative Percent Difference.

TABLE A.9

QUALIFIED SAMPLE RESULTS DUE TO OUTLYING SPIKE RECOVERIES
 EMBANKMENT BENEATH PIER 25
 PORT OF TACOMA INDUSTRIAL YARD
 TACOMA, WASHINGTON

| Analyte | Spike ID | Spike Recovery (percent) | Control Limit (percent) | Associated Samples | Sample Results | Qualifier | Units |
|----------|-------------|--------------------------|-------------------------|---|---|---------------------------------|---|
| PCB1260 | 12 (0-0.33) | 44 | 45-124 | 12 (0-0.33) | 990 | J | mg/Kg |
| Antimony | 1 (0-0.5) | 0 | 75-125 | 5 (0-0.42) 7 (0-0.33) 8 (0-0.33) 9 (0-0.33) 3 (0-0.33) | 7 23 5 53 16 | J J J J J | mg/Kg mg/Kg mg/Kg mg/Kg mg/Kg |
| | | | | 3 (0-0.33) Dup 11 (0-0.33) 2 (0-0.5) 10 (0-0.33) 12 (0-0.33) 6 (0-0.33) 1 (0-0.5) | 12 4.1 9 33 8.4 6.1 3.6 | J J J J J J J | mg/Kg mg/Kg mg/Kg mg/Kg mg/Kg mg/Kg mg/Kg |
| Arsenic | 1 (0-0.5) | 150 | 75-125 | 5 (0-0.42) 7 (0-0.33) 8 (0-0.33) 9 (0-0.33) 3 (0-0.33) | 42 17 67 52 100 | J J J J J | mg/Kg mg/Kg mg/Kg mg/Kg mg/Kg |
| | | | | 3 (0-0.33) Dup 11 (0-0.33) 2 (0-0.5) 10 (0-0.33) 12 (0-0.33) 6 (0-0.33) 1 (0-0.5) | 140 36 45 64 64 57 30 | J J J J J J J | mg/Kg mg/Kg mg/Kg mg/Kg mg/Kg mg/Kg mg/Kg |

TABLE A.9

QUALIFIED SAMPLE RESULTS DUE TO OUTLYING SPIKE RECOVERIES
 EMBANKMENT BENEATH PIER 25
 PORT OF TACOMA INDUSTRIAL YARD
 TACOMA, WASHINGTON

| Analyte | Spike ID | Spike Recovery (percent) | Control Limit (percent) | Associated Samples | Sample Results | Qualifier | Units |
|----------|--------------|--------------------------|-------------------------|--|----------------------------------|-----------------------|-------|
| Cadmium | 1 (0-05) | 386 | 75-125 | 5 (0-042) 7 (0-033) 8 (0-033) 9 (0-033) | 0.36 0.12 0.43 1.7 | J J J J | mg/Kg |
| | | | | 3 (0-033) Dup 1.1 (0-033) | 1.4 1.5 0.39 | J J J | mg/Kg |
| | | | | 2 (0-05) 10 (0-033) 12 (0-033) 6 (0-033) 1 (0-0.5) | 0.6 1.2 0.7 1.2 0.36 | J J J J J | mg/Kg |
| Zinc | 5B (1.5-3.0) | 199 | 75-125 | 5B (1.5-3.0) | 290 | J | mg/Kg |
| Chromium | 5B (1.5-3.0) | 127 | 75-125 | 5B (1.5-3.0) | 47 | J | mg/Kg |

Notes:

Dup Field Duplicate.

J Estimated.

PCB Polychlorinated Biphenyl.

TABLE A.10
QUALIFIED SAMPLE RESULTS DUE TO POOR LABORATORY DUPLICATE PRECISION
EMBANKMENT BENEATH PIER 25
PORT OF TACOMA INDUSTRIAL YARD
TACOMA, WASHINGTON

| Analyte | Sample ID | Original Result | Duplicate Result | RPD | Control Limit | Associated Sample IDs | Sample Results | Qualifier | Units |
|----------|-----------|-----------------|------------------|-----|---------------|---|---|--|---|
| Antimony | 1 (0-0.5) | 3.6 | 5.3 | 38 | 0.35 | 5 (0-0.42) 7 (0-0.33) 8 (0-0.33) 9 (0-0.33) 3 (0-0.33) | 7 23 5 53 16 12 4.1 9 33 8.4 6.1 3.6 13 | J J J J J J J J J J J J | mg/Kg mg/Kg mg/Kg mg/Kg mg/Kg mg/Kg mg/Kg mg/Kg mg/Kg mg/Kg mg/Kg mg/Kg mg/Kg |
| | | | | | | 3 (0-0.33) Dup 11 (0-0.33) 2 (0-0.5) 10 (0-0.33) 12 (0-0.33) 6 (0-0.33) 1 (0-0.5) 3A (0-1.5) | | | |
| | | | | | | | | | |
| Copper | 1 (0-0.5) | 589 | 2020 | 110 | 0.35 | 5 (0-0.42) 7 (0-0.33) 8 (0-0.33) 9 (0-0.33) 3 (0-0.33) | 330 60 240 15000 1100 1100 220 400 1100 1000 310 590 | J J J J J J J J J J J | mg/Kg mg/Kg mg/Kg mg/Kg mg/Kg mg/Kg mg/Kg mg/Kg mg/Kg mg/Kg mg/Kg mg/Kg |
| | | | | | | 3 (0-0.33) Dup 11 (0-0.33) 2 (0-0.5) 10 (0-0.33) 12 (0-0.33) 6 (0-0.33) 1 (0-0.5) | | | |

TABLE A.10
QUALIFIED SAMPLE RESULTS DUE TO POOR LABORATORY DUPLICATE PRECISION
EMBANKMENT BENEATH PIER 25
PORT OF TACOMA INDUSTRIAL YARD
TACOMA, WASHINGTON

| <i>Analyte</i> | <i>Sample ID</i> | <i>Original Result</i> | <i>Duplicate Result</i> | <i>RPD</i> | <i>Control Limit</i> | <i>Associated Sample IDs</i> | <i>Sample Results</i> | <i>Qualifier</i> | <i>Units</i> |
|----------------|------------------|------------------------|-------------------------|------------|----------------------|------------------------------|-----------------------|------------------|--------------|
| Zinc | 1 (0-0.5) | 1640 | 300 | 138 | 0-35 | 5 (0-0.42) | 860 | J | mg/Kg |
| | | | | | | 7 (0-0.33) | 180 | J | mg/Kg |
| | | | | | | 8 (0-0.33) | 650 | J | mg/Kg |
| | | | | | | 9 (0-0.33) | 2200 | J | mg/Kg |
| | | | | | | 3 (0-0.33) | 1400 | J | mg/Kg |
| | | | | | | 3 (0-0.33) Dup | 1700 | J | mg/Kg |
| | | | | | | 11 (0-0.33) | 530 | J | mg/Kg |
| | | | | | | 2 (0-0.5) | 900 | J | mg/Kg |
| | | | | | | 10 (0-0.33) | 1600 | J | mg/Kg |
| | | | | | | 12 (0-0.33) | 3300 | J | mg/Kg |
| | | | | | | 6 (0-0.33) | 1300 | J | mg/Kg |
| | | | | | | 1 (0-0.5) | 1600 | J | mg/Kg |
| Chromium | 3B (0-1.5) | 34 | 74 | 74 | 0-35 | 3B (0-1.5) | 34 | J | mg/Kg |

Notes:
 Dup Field Duplicate.
 J Estimated.
 RPD Relative Percent Difference.

TABLE A.11

QUALIFIED SAMPLE RESULTS DUE TO OUTLYING SERIAL DILUTIONS
 EMBANKMENT BENEATH PIER 25
 PORT OF TACOMA INDUSTRIAL YARD
 TACOMA, WASHINGTON

| <i>Analyte</i> | <i>Sample ID</i> | <i>%D</i> | <i>Control Limits</i> (percent) | <i>Associated Samples</i> | <i>Sample Results</i> | <i>Qualifier</i> | <i>Units</i> |
|----------------|------------------|-----------|------------------------------------|---------------------------|-----------------------|------------------|--------------|
| Zinc | 3B (0-1.5) | 14 | 0-10 | 3B (0-1.5) | 220 | J | mg/Kg |
| Lead | 3B (0-1.5) | 14 | 0-10 | 3B (0-1.5) | 230 | J | mg/Kg |

Notes:

%D Percent Difference.
 | Estimated.

TABLE A.12
SAMPLES WITH PERCENT SOLIDS LESS THAN 50 PERCENT
EMBANKMENT BENEATH PIER 25
PORT OF TACOMA INDUSTRIAL YARD
TACOMA, WASHINGTON

| <i>Location</i> | <i>Percent Solids</i> |
|-----------------|-----------------------|
| 11A (0-0.3) | 47 |
| 11A (0-1.5) | 48 |
| 11A (1.5-3.0) | 46 |
| 11B (0-0.3) | 45 |
| 11B (0-1.5) | 42 |
| 11B (1.5-3.0) | 41 |
| 9B (0-1.5) | 45 |
| 9B (1.5-3.0) | 45 |
| 7A (0-0.3) | 40 |
| 7B (1.5-3.0) | 31 |
| 5A (0-0.3) | 44 |
| 5A (0-1.0) | 35 |
| 5A (1.0-3.0) | 31 |
| 5B (0-0.3) | 43 |
| 5B (0-1.5) | 35 |
| 5B (1.5-3.0) | 31 |
| 3A (0-0.3) | 40 |
| 3A (0-0.3) Dup | 41 |
| 3B (0-0.3) | 47 |
| 3B (0-1.5) | 27 |
| 3B (1.5-3.0) | 25 |
| 1A (0-0.3) | 46 |
| 1A (0-1.5) | 15 |
| 1A (1.5-3.0) | 16 |

Notes:

Dup Field Duplicate.

TABLE A.13

QUALIFIED SAMPLE RESULTS DUE TO VARIABILITY IN FIELD DUPLICATE RESULTS
 EMBANKMENT BENEATH PIER 25
 PORT OF TACOMA INDUSTRIAL YARD
 TACOMA, WASHINGTON

| Parameter | Analyte | Original | | Duplicate | | RPD | Qualifier (1) |
|----------------|--------------------------|-------------|--------------------------------|-------------|--------------------------------|-----|---------------|
| | | Location ID | Result ($\mu\text{g/Kg}$) | Location ID | Result ($\mu\text{g/Kg}$) | | |
| Semi-Volatiles | Acenaphthene | 3 (0-0.33) | 150 | 3 (0-0.33) | 1100 | 152 | J |
| | Anthracene | 3 (0-0.33) | 1000 | 3 (0-0.33) | 15000 | 175 | J |
| | Benz(a)anthracene | 3 (0-0.33) | 2400 | 3 (0-0.33) | 12000 | 133 | J |
| | Benzo(a)pyrene | 3 (0-0.33) | 2700 | 3 (0-0.33) | 7400 | 93 | J |
| | Benzo(b)fluoranthene | 3 (0-0.33) | 3200 | 3 (0-0.33) | 7600 | 81 | J |
| | Benzo(g,h,i)fluoranthene | 3 (0-0.33) | 1100 | 3 (0-0.33) | 2700 | 84 | J |
| | Benzo(k)fluoranthene | 3 (0-0.33) | 2400 | 3 (0-0.33) | 7500 | 103 | J |
| | Chrysene | 3 (0-0.33) | 3400 | 3 (0-0.33) | 14000 | 122 | J |
| | Dibenz[a,h]anthracene | 3 (0-0.33) | 740 | 3 (0-0.33) | 1700 | 79 | J |
| | Dibenzofuran | 3 (0-0.33) | 150 | 3 (0-0.33) | 570 | 117 | J |
| | Fluoranthene | 3 (0-0.33) | 5800 | 3 (0-0.33) | 60000 | 165 | J |
| | Fluorene | 3 (0-0.33) | 310 | 3 (0-0.33) | 2000 | 146 | J |
| | Hexachlorobenzene | 3 (0-0.33) | 110 | 3 (0-0.33) | 200 | 58 | J |
| | Hexachlorobutadiene | 3 (0-0.33) | 18 | 3 (0-0.33) | 64 | 112 | J |
| | Indeno(1,2,3-cd)pyrene | 3 (0-0.33) | 1800 | 3 (0-0.33) | 4200 | 80 | J |
| Naphthalene | Naphthalene | 3 (0-0.33) | 58 | 3 (0-0.33) | 120 | 70 | J |
| | Phenanthrene | 3 (0-0.33) | 3100 | 3 (0-0.33) | 20000 | 146 | J |
| | Pyrene | 3 (0-0.33) | 4100 | 3 (0-0.33) | 35000 | 158 | J |

TABLE A.13

QUALIFIED SAMPLE RESULTS DUE TO VARIABILITY IN FIELD DUPLICATE RESULTS
 EMBANKMENT BENEATH PIER 25
 PORT OF TACOMA INDUSTRIAL YARD
 TACOMA, WASHINGTON

| Parameter | Analyte | Original | | Duplicate | | RPD | Qualifier (1) |
|-----------------|-------------------------|--------------|--------------------------------|--------------|--------------------------------|-----|---------------|
| | | Location ID | Result ($\mu\text{g/Kg}$) | Location ID | Result ($\mu\text{g/Kg}$) | | |
| Semi-Volatiles | Acenaphthene | 7A (1.5-3.0) | 7800 | 7A (1.5-3.0) | 3700 | 71 | J |
| | Benz(o,h,i)fluoranthene | 7A (1.5-3.0) | 720 | 7A (1.5-3.0) | 220 | 106 | J |
| | Benzo(k)fluoranthene | 7A (1.5-3.0) | 1800 | 7A (1.5-3.0) | 880 | 69 | J |
| | Chrysene | 7A (1.5-3.0) | 120 | 7A (1.5-3.0) | 460 | 117 | J |
| | Dibenz(a,h)anthracene | 7A (1.5-3.0) | 450 | 7A (1.5-3.0) | 130 | 110 | J |
| | Fluorene | 7A (1.5-3.0) | 2300 | 7A (1.5-3.0) | 5400 | 81 | J |
| | Indeno(1,2,3-cd)pyrene | 7A (1.5-3.0) | 840 | 7A (1.5-3.0) | 320 | 90 | J |
| | Naphthalene | 7A (1.5-3.0) | 230 | 7A (1.5-3.0) | 720 | 103 | J |
| | Phenanthrene | 7A (1.5-3.0) | 1600 | 7A (1.5-3.0) | 4800 | 100 | J |
| Volatiles | Ethyl benzene | 7A (1.5-3.0) | 57 | 7A (1.5-3.0) | 3.9 | 174 | J |
| Pesticides/PCBs | PCB 1254 | 7A (1.5-3.0) | 1600 | 7A (1.5-3.0) | 740 | 74 | J |
| | PCB1260 | 7A (1.5-3.0) | 2100 | 7A (1.5-3.0) | 900 | 80 | J |

TABLE A.13

QUALIFIED SAMPLE RESULTS DUE TO VARIABILITY IN FIELD DUPLICATE RESULTS
 EMBANKMENT BENEATH PIER 25
 PORT OF TACOMA INDUSTRIAL YARD
 TACOMA, WASHINGTON

| Parameter | Analyte | Original | | Duplicate | | RPD | Qualifier (1) |
|-----------|---------|--------------|----------------|--------------|----------------|-----|---------------|
| | | Location ID | Result (mg/Kg) | Location ID | Result (mg/Kg) | | |
| Metals | Lead | 3 (0-0.33) | 3300 | 3 (0-0.33) | 1200 | 93 | J |
| Metals | Arsenic | 7A (1.5-3.0) | 41 | 7A (1.5-3.0) | 24 | 52 | J |

Notes:

- (1) Qualifier applied to both sample results.
- J Estimated.

RPD Relative Percent Difference.

ATTACHMENT A.1

CHAIN OF CUSTODY FORMS

Form No. 1250-1200-100000000000

CONESTOGA ROVERS & ASSOCIATES, INC.
 Suite 150
 1351 Oakbrook Drive
 Norcross, GA 30093
CHAIN OF CUSTODY RECORD

7842-80

SAMPLERS' SIGNATURE:

PRINTED NAME: *J. Schuhmacher*

PROJECT NAME: ENRICHMENT beneath Pier 25 (Port)

REMARKS

| SEQ. NO. | DATE | TIME | SAMPLE NUMBER | SAMPLE TYPE | PARAMETERS | | | | CONTAINERS NO. OF CUTTINGS | REMARKS |
|----------------------------|---------|------|---------------------|----------------|------------|-----|-----------------|-----------------|----------------------------------|---------|
| | | | | | TEMP | HUM | CO ₂ | SO ₂ | | |
| 1 | 1/20/88 | | SE - 0120 98-T05-01 | SED | 4 | X | X | X | 4 | 98-1907 |
| 2 | | | SE - 0120 98-T05-02 | | 4 | X | X | X | | |
| 3 | | | SE - 0120 98-T05-03 | | 4 | X | X | X | | |
| 4 | | | SE - 0120 98-T05-04 | | 4 | X | X | X | | |
| 5 | | | SE - 0120 98-T05-05 | | 4 | X | X | X | | |
| 6 | | | SE - 0120 98-T05-06 | | 4 | X | X | X | | |
| 7 | | | SE - 0120 98-T05-07 | | 4 | X | X | X | | |
| 8 | | | SE - 0120 98-T05-08 | | 4 | X | X | X | | |
| 9 | | | SE - 0120 98-T05-09 | | 4 | X | X | X | | |
| 10 | | | SE - 0120 98-T05-10 | | 4 | X | X | X | | |
| 11 | | | SE - 0120 98-T05-11 | | 4 | X | X | X | | |
| 12 | | | SE - 0120 98-T05-12 | | 4 | X | X | X | | |
| 13 | | | SE - 0120 98-T05-13 | | 4 | X | X | X | | |
| 14 | | | SE - 0120 98-T05-14 | | 4 | X | X | X | | |
| 15 | | | SE - 0120 98-T05-15 | | 4 | X | X | X | | |
| TOTAL NUMBER OF CONTAINERS | | | | | 60 | | | | | |

RELINQUISHED BY: *J. Schuhmacher*RECEIVED BY: *J. Schuhmacher*

DATE: 1/24/88

TIME: 11:35 AM

RELINQUISHED BY: *J. Schuhmacher*RECEIVED BY: *J. Schuhmacher*

DATE: 1/24/88

TIME: 11:35 AM

RELINQUISHED BY: *J. Schuhmacher*RECEIVED BY: *J. Schuhmacher*

DATE: 1/24/88

TIME: 11:35 AM

RELINQUISHED BY: *J. Schuhmacher*RECEIVED BY: *J. Schuhmacher*

DATE: 1/24/88

TIME: 11:35 AM

METHOD OF SHIPMENT: Hand Delivery

SAMPLE TEAM: *J. Schuhmacher*AIR BILL NUMBER: *J. Schuhmacher*

- White : Fully Executed Copy
 Yellow : Receiving Laboratory Copy
 Pink : Sampler Copy
 Gold : Chemist Copy

No. 0532
 DATE: 1/21/88 TIME: 1351

CONEX
GA-HOVENH & ASSOCIATES, INC.
1351 Brook Drive
Norcross, GA 30093

ART

REFERENCE NUMBER:
Suite 150
404-441-0027

CHAIN OF CUSTODY RECORD

PROJECT NAME:
Brabank Reservoir Pier 25 (Port)

SAMPLER'S SIGNATURE: 
NAME: J. SCHMALZLE

PRINTED SAMPLE LIST

| SEQ. NO. | DATE | TIME | SAMPLE NUMBER | SAMPLE TYPE | CONTAINERS | PARAMETERS | REMARKS |
|----------|------|------|---------------|-------------|------------|------------|---------|
|----------|------|------|---------------|-------------|------------|------------|---------|

| | | | | | | | |
|----|---------|--|-----------------------------|-------|---|---------|--|
| 16 | 1/20/98 | | SE - 012098 - TS - 16 ✓ | SED | 4 | X X X X | |
| 17 | 1 | | SE - 012098 - TS - 17 ✓ | ✓ | 4 | X X X X | |
| 18 | | | SE - 012098 - TS - 18 ✓ | ✓ | 4 | X X X X | |
| 19 | | | SE - 012098 - TS - 19 ✓ | ✓ | 4 | X X X X | |
| 20 | | | SE - 012098 - TS - 20 ✓ | ✓ | 4 | X X X X | |
| 21 | | | SE - 012098 - TS - 21 ✓ | ✓ | 4 | X X X X | |
| 22 | | | SE - 012098 - TS - 22 ✓ | ✓ | 4 | X X X X | |
| 23 | | | SE - 012098 - TS - 23 ✓ | ✓ | 4 | X X X X | |
| 24 | | | SE - 012098 - TS - 24 ✓ | ✓ | 4 | X X X X | |
| 25 | - | | SE - 012098 - TS - 25 msd ✓ | ✓ | 8 | X X X X | |
| 26 | | | W - 012098 - TS - 01 | Water | 8 | X X X X | |
| 27 | 1/21/98 | | SE - 012198 - TS - 26 ✓ | ✓ | 4 | X X X X | |
| 28 | | | SE - 012198 - TS - 27 ✓ | ✓ | 4 | X X X X | |
| 29 | | | SE - 012198 - TS - 28 msd ✓ | ✓ | 8 | X X X X | |
| 30 | | | SE - 012198 - TS - 29 ✓ | ✓ | 4 | X X X X | |

TOTAL NUMBER OF CONTAINERS

| | | | | | |
|------------------|---------------|---------------|--------------|---------------|---------------|
| RELINQUISHED BY: | DATE: 1/21/98 | TIME: 1:33 PM | RECEIVED BY: | DATE: 1/21/98 | TIME: 1:33 PM |
| ① | | | ② | | |
| RELINQUISHED BY: | DATE: 1/21/98 | TIME: 1:33 PM | RECEIVED BY: | DATE: 1/21/98 | TIME: 1:33 PM |
| ② | | | ③ | | |
| RELINQUISHED BY: | DATE: 1/21/98 | TIME: 1:33 PM | RECEIVED BY: | DATE: 1/21/98 | TIME: 1:33 PM |
| ③ | | | ④ | | |

METHOD OF SHIPMENT:

| | | | |
|---------|---------------------------|--------------|----------------|
| White | Fully Executed Copy | SAMPLE TEAM: | RECEIVED BY: |
| Yellow | Receiving Laboratory Copy | J. SCHMALZLE | John Schmalzle |
| Pink | Sampler Copy | | |
| Goldenn | Chemist Copy | | |

AIR BILL NUMBER:

| | |
|-------|---------|
| NO. | 0537 |
| DATE: | 1/21/98 |
| TIME: | 1:33 PM |

APPENDIX B

**ANALYTICAL DATA AND VALIDATION ASSESSMENT
HIGH RESOLUTION PCB ANALYSES
EMBANKMENT BENEATH PIER 25
PORT OF TACOMA INDUSTRIAL YARD
TACOMA, WASHINGTON
JANUARY 1998**

TABLE OF CONTENTS

| | <u>Page</u> |
|--|-------------|
| B1.0 INTRODUCTION..... | 1 |
| B2.0 QUALITY ASSURANCE/QUALITY CONTROL REVIEW..... | 2 |
| B3.0 CONCLUSION | 3 |

LIST OF TABLES
(Following Appendix)

- TABLE B.1 SAMPLE COLLECTION SUMMARY
- TABLE B.2 ANALYTICAL RESULTS SUMMARY
- TABLE B.3 HOLDING TIME SUMMARY
- TABLE B.4 INTERNAL/CLEANUP STANDARD RECOVERIES (PERCENT)
- TABLE B.5 ONGOING PRECISION AND RECOVERY (OPR) SAMPLE RESULTS
- TABLE B.6 METHOD BLANK SUMMARY

LIST OF ATTACHMENTS

- ATTACHMENT B.1 CHAIN OF CUSTODY DOCUMENT

B1.0 INTRODUCTION

Seven sediment samples from six locations were collected from the embankment beneath the Port of Tacoma Industrial Yard Pier 25 in Tacoma, Washington in January 1998. The samples were composited by the laboratory and were analyzed for polychlorinated biphenyl (PCB) congeners using United States Environmental Protection Agency's (USEPA's) Method 1668 "Toxic PCBs by Isotope Dilution HRGC/HRMS". Based upon a review of preliminary PCB Aroclor analytical data (USEPA Method 8082), three samples from the original composite were subsequently analyzed individually for PCB congeners. A copy of the Chain of Custody document is included in Attachment B.1.

A sample analysis summary is presented in Table B.1. A summary of the analytical data is presented in Table B.2; all data are reported on a dry weight basis. The Quality Assurance/Quality Control (QA/QC) criteria by which these data have been assessed are outlined in the analytical method and the "USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review" EPA 540/R-94/012, February 1994.

The following QA/QC assessment includes a review of all raw data including calibration, internal standard recoveries, ongoing precision and recovery sample results, and method blank results.

B2.0 QUALITY ASSURANCE/QUALITY CONTROL REVIEW

The holding time specified in the method is one year from date of collection to sample extraction and one year from date of extraction to sample analysis. A summary of sample holding times is provided in Table B.3. All samples were extracted and analyzed within the required holding times. All samples were properly transported and stored at 4°C ($\pm 2^\circ\text{C}$).

INSTRUMENT CALIBRATION

The High Resolution Gas Chromatograph/High Resolution Mass Spectrometer (HRGC/HRMS) instrumentation was properly tuned prior to sample analysis. Overall, calibration data showed adequate instrument sensitivity and linearity, and all ion abundance ratios were within the method-specified control limits.

Calibration verification standards were analyzed at the proper frequency and all native and labeled analyte concentrations were acceptable. For each congener, the ion abundance ratios were within the method-specified control limits.

INTERNAL STANDARD RECOVERIES

A summary of the internal standard (IS) recoveries is presented in Table B.4. The proper internal standard compounds were added to all samples, blanks, and blank spikes prior to extraction. Internal standards were used to quantify the PCB congeners present in the samples (isotope-dilution mass spectrometry) as well as to determine the overall method efficiency. All recoveries were acceptable.

ONGOING PRECISION AND RECOVERY (OPR) SAMPLE ANALYSES

An OPR sample was extracted with each sample batch to access analytical accuracy. A summary of the OPR sample results is presented in Table B.5. All results were acceptable, indicating that good overall accuracy was achieved for this method.

METHOD BLANK ANALYSIS

A method blank was extracted with each sample batch and a summary of method blank results is presented in Table B.6. All method blank results for the congeners of interest were non-detect.

3.0 **CONCLUSION**

Based on this QA/QC review, these data are judged to be acceptable for their intended use without qualification.

APPENDIX B - TABLES

TABLE B.1
SAMPLE ANALYSIS SUMMARY
HIGH RESOLUTION PCB ANALYSES
EMBANKMENT BEneath PIER 25
PORT OF TACOMA INDUSTRIAL YARD

| <i>Sample ID</i> | <i>Sample Location</i> | <i>Sample Date</i> | <i>Location</i> | <i>Analysis</i> |
|---|------------------------|--------------------|--------------------------|------------------|
| PT-010998-CFD-007 | POT-9 | 01/09/98 | Port of Tacoma | HR PCB Congeners |
| PT-010998-CFD-008 | POT-3 | 01/09/98 | Port of Tacoma | HR PCB Congeners |
| PT-010998-CFD-010 | POT-11 | 01/09/98 | Port of Tacoma | HR PCB Congeners |
| PT-010998-CFD-002/008/009/004/005/007/010 | POT-1, 3, 5, 7, 9, 11 | 01/09/98 | Port of Tacoma Composite | HR PCB Congeners |

Notes:
HR PCB High Resolution Polychlorinated Biphenyls.

TABLE B.2

Page 1 of 2

**ANALYTICAL RESULTS SUMMARY
HIGH RESOLUTION PCB ANALYSIS
EMBANKMENT BENEATH PIER 25
PORT OF TACOMA INDUSTRIAL YARD**

| <i>Sample Location:</i> | <i>POT-3</i> | <i>POT-9</i> | <i>POT-11</i> | <i>Port of Tacoma Composite</i> |
|-------------------------|--------------|--------------|---------------|---------------------------------|
| <i>Collection Date:</i> | 01/09/98 | 01/09/98 | 01/09/98 | 01/09/98 |
| <i>Units:</i> | ng/g | ng/g | ng/g | ng/g |
| PCB Congeners | | | | |
| PCB-1 | 1.1 | ND 0.47 | ND 0.49 | 0.065 |
| PCB-3 | 0.49 | 0.52 | ND 0.49 | 0.10 |
| PCB-8 | 3.1 | 1.9 | 0.53 | 0.80 |
| PCB-15 | 2.4 | 2.4 | 1.1 | 0.78 |
| PCB-18 | 2.4 | 3.9 | 1.0 | 2.5 |
| PCB-28 | 4.9 | 11 | 3.1 | 5.7 |
| PCB-44 | 5.1 | 8.4 | 2.0 | 5.2 |
| PCB-52 | 9.4 | 17 | 3.6 | 9.8 |
| PCB-66 | 6.6 | 10 | 2.8 | 2.3 |
| PCB-77 | 0.68 | 1.2 | 0.54 | 0.72 |
| PCB-81 | ND 0.45 | ND 0.51 | ND 0.49 | 0.11 |
| PCB-87/115 | 14 | 25 | 8.2 | 1.2 |
| PCB-90/101 | 41 | 86 | 41 | 37 |
| PCB-118 | 27 | 46 | 15 | 29 |
| PCB-123 | 3.0 | 5.3 | 2.8 | 3.9 |
| PCB-105 | 10 | 17 | 5.2 | 11 |
| PCB-114 | 0.60 | 0.89 | ND 0.49 | 0.71 |
| PCB-126 | ND 0.45 | ND 0.47 | ND 0.49 | 0.19 |
| PCB-128/167 | 10 | 16 | 15 | 10 |
| PCB-138/158 | 76 | 150 | 170 | 25 |
| PCB-153/168 | 69 | 130 | 140 | 60 |
| PCB-156 | 4.1 | 8.2 | 7.1 | 4.6 |
| PCB-157 | 1.1 | 1.4 | 0.87 | 0.94 |
| PCB-169 | ND 0.45 | ND 0.47 | ND 0.49 | ND 0.050 |
| PCB-170 | 31 | 54 | 88 | 34 |
| PCB-180 | 100 | 130 | 200 | 90 |
| PCB-183 | 20 | 29 | 41 | 18 |
| PCB-184 | ND 0.45 | ND 0.47 | ND 0.49 | ND 0.050 |
| PCB-187 | 53 | 69 | 79 | 43 |
| PCB-189 | 0.82 | 1.6 | 2.8 | 0.99 |
| PCB-202 | 12 | 8.6 | 8.0 | 8.6 |
| PCB-194 | 42 | 30 | 41 | 31 |
| PCB-195 | 12 | 11 | 16 | 8.0 |
| PCB-206 | 93 | 44 | 54 | 52 |
| PCB-207 | 3.3 | 1.6 | 2.4 | 2.8 |
| PCB-209 | 100 | 39 | 58 | 79 |

TABLE B.2

Page 2 of 2

**ANALYTICAL RESULTS SUMMARY
HIGH RESOLUTION PCB ANALYSIS
EMBANKMENT BENEATH PIER 25
PORT OF TACOMA INDUSTRIAL YARD**

| <i>Sample Location:</i> | POT-3 | POT-9 | POT-11 | <i>Port of Tacoma Composite</i> |
|------------------------------------|-------------|-------------|-------------|---------------------------------|
| <i>Collection Date:</i> | 01/09/98 | 01/09/98 | 01/09/98 | 01/09/98 |
| <i>Units:</i> | ng/g | ng/g | ng/g | ng/g |
| PCB Congener Homolog Totals | | | | |
| Total monoCB | 1.5 | 0.52 | ND 0.49 | 0.17 |
| Total diCB | 8.1J | 5.4J | 2.2J | 2.2 |
| Total triCB | 13J | 27J | 5.9J | 15 |
| Total tetraCB | 46J | 83J | 18J | 53 |
| Total pentaCB | 230J | 410J | 180J | 230 |
| Total hexaCB | 290J | 530J | 620J | 190 |
| Total heptaCB | 300J | 430J | 600J | 270 |
| Total octaCB | 200J | 140J | 180J | 130 |
| Total nonaCB | 110J | 53J | 67J | 68 |
| Total decaCB | 100 | 39 | 58 | 79 |
| Total PCBs | 1300 | 1700 | 1700 | 1000 |

Notes:

- J Estimated.
- PCBs Polychlorinated Biphenyls.
- ND x Not detected at or above x.

TABLE B.3
 HOLDING TIME SUMMARY
 HIGH RESOLUTION PCB ANALYSIS
 EMBANKMENT BENEATH PIER 25
 PORT OF TACOMA INDUSTRIAL YARD

| <i>Location ID</i> | <i>Collection Date</i> | <i>Extraction Date</i> | <i>Analysis Date</i> | <i>Holding Time Exceedance (days)</i> | |
|---|-------------------------------|-------------------------------|-----------------------------|--|---------------------------|
| | | | | <i>to Extraction</i> | <i>to Analysis</i> |
| <i>Polychlorinated Biphenyls</i> | | | | | |
| POT-3 | 01/09/98 | 03/23/98 | 04/02/98 | 0 | 0 |
| POT-9 | 01/09/98 | 03/23/98 | 04/02/98 | 0 | 0 |
| POT-11 | 01/09/98 | 03/23/98 | 04/02/98 | 0 | 0 |
| Port of Tacoma Composite | 01/09/98 | 01/16/98 | 01/20/98 | 0 | 0 |

TABLE B.4

INTERNAL/CLEANUP STANDARD RECOVERIES (PERCENT)
HIGH RESOLUTION PCB ANALYSIS
EMBANKMENT BENEATH PIER 25
PORT OF TACOMA INDUSTRIAL YARD

| <i>Sample Location:</i> | POT-3 | POT-9 | POT-11 | <i>Port of Tacoma Composite</i> |
|---------------------------|--------|-------|--------|---------------------------------|
| <i>Control Limits</i> | | | | |
| <i>Internal Standards</i> | | | | |
| C13-PCB-3 | 25-150 | 79 | 83 | 87 |
| C13-PCB-28 | 25-150 | 85 | 104 | 97 |
| C13-PCB-77 | 24-169 | 90 | 100 | 93 |
| C13-PCB-101 | 25-150 | 80 | 80 | 85 |
| C13-PCB-118 | 21-178 | 80 | 99 | 91 |
| C13-PCB-105 | 21-178 | 85 | 105 | 83 |
| C13-PCB-126 | 21-178 | 82 | 111 | 90 |
| C13-PCB-138 | 25-150 | 84 | 103 | 92 |
| C13-PCB-156 | 26-152 | 90 | 112 | 83 |
| C13-PCB-157 | 26-152 | 96 | 114 | 98 |
| C13-PCB-169 | 26-152 | 84 | 100 | 92 |
| C13-PCB-180 | 23-143 | 86 | 99 | 88 |
| C13-PCB-202 | 25-150 | 94 | 103 | 97 |
| C13-PCB-194 | 25-150 | 75 | 88 | 70 |
| C13-PCB-208 | 25-150 | 75 | 88 | 74 |
| C13-PCB-209 | 25-150 | 87 | 98 | 89 |
| | | | | 90 |

TABLE B.5
ONGOING PRECISION AND RECOVERY (OPR) SAMPLE RESULTS
HIGH RESOLUTION PCB ANALYSIS
EMBANKMENT BENEATH PIER 25
PORT OF TACOMA INDUSTRIAL YARD

| <i>Sample ID:</i> | <i>OPR</i> | <i>OPR</i> | |
|----------------------------------|--------------------|--------------------|-----|
| | 1/16/98 (ng/ml) | 3/23/98 (ng/ml) | |
| <i>Control</i> | | | |
| <i>Limits</i> | | | |
| <i>(ng/ml)</i> | | | |
| <i>Polychlorinated Biphenyls</i> | | | |
| PCB-1 | 70-140 | 88 | 96 |
| PCB-3 | 70-140 | 89 | 100 |
| PCB-8 | 70-140 | 92 | 94 |
| PCB-15 | 70-140 | 96 | 89 |
| PCB-18 | 70-140 | 102 | 87 |
| PCB-28 | 70-140 | 90 | 98 |
| PCB-44 | 70-140 | 87 | 92 |
| PCB-52 | 70-140 | 87 | 94 |
| PCB-66 | 70-140 | 89 | 94 |
| PCB-77 | 70-160 | 90 | 95 |
| PCB-81 | 70-140 | 87 | 89 |
| PCB-87/115 | 140-280 | 194 | 220 |
| PCB-90/101 | 140-280 | 195 | 218 |
| PCB-118 | 68-160 | 97 | 96 |
| PCB-123 | 14-330 | 98 | 90 |
| PCB-105 | 68-160 | 94 | 98 |
| PCB-114 | 70-140 | 93 | 88 |
| PCB-126 | 68-160 | 93 | 99 |
| PCB-128/167 | 128-340 | 165 | 192 |
| PCB-138/158 | 140-280 | 164 | 192 |
| PCB-153/168 | 140-280 | 152 | 186 |
| PCB-156 | 64-170 | 90 | 95 |
| PCB-157 | 64-170 | 85 | 94 |
| PCB-169 | 64-170 | 85 | 95 |
| PCB-170 | 70-140 | 96 | 95 |
| PCB-180 | 70-140 | 94 | 95 |
| PCB-183 | 70-140 | 101 | 96 |
| PCB-184 | 70-140 | 96 | 93 |
| PCB-187 | 70-140 | 97 | 92 |
| PCB-189 | 70-140 | 95 | 93 |
| PCB-202 | 70-140 | 112 | 92 |
| PCB-194 | 70-140 | 100 | 105 |
| PCB-195 | 70-140 | 106 | 97 |
| PCB-206 | 70-140 | 111 | 100 |
| PCB-207 | 70-140 | 110 | 100 |
| PCB-209 | 70-140 | 94 | 95 |

TABLE B.6
METHOD BLANK SUMMARY
HIGH RESOLUTION PCB ANALYSIS
EMBANKMENT BENEATH PIER 25
PORT OF TACOMA INDUSTRIAL YARD

| <i>Extraction Date:</i> | 01/16/98 | 03/23/98 |
|---|-----------------|-----------------|
| <i>Units:</i> | ng/g | ng/g |
| <i>Polychlorinated Biphenyls</i> | | |
| PCB-1 | ND 0.050 | ND 0.50 |
| PCB-3 | ND 0.050 | ND 0.50 |
| PCB-8 | ND 0.050 | ND 0.50 |
| PCB-15 | ND 0.050 | ND 0.50 |
| PCB-18 | ND 0.050 | ND 0.50 |
| PCB-28 | ND 0.050 | ND 0.50 |
| PCB-44 | ND 0.050 | ND 0.50 |
| PCB-52 | ND 0.050 | ND 0.50 |
| PCB-66 | ND 0.050 | ND 0.50 |
| PCB-77 | ND 0.050 | ND 0.50 |
| PCB-81 | ND 0.050 | ND 0.50 |
| PCB-87/115 | ND 0.050 | ND 0.50 |
| PCB-90/101 | ND 0.050 | ND 0.50 |
| PCB-118 | ND 0.050 | ND 0.50 |
| PCD-123 | ND 0.050 | ND 0.50 |
| PCB-105 | ND 0.050 | ND 0.50 |
| PCB-114 | ND 0.050 | ND 0.50 |
| PCB-126 | ND 0.050 | ND 0.50 |
| PCB-128/167 | ND 0.050 | ND 0.50 |
| PCB-138/158 | ND 0.050 | ND 0.50 |
| PCB-153/168 | ND 0.050 | ND 0.50 |
| PCB-156 | ND 0.050 | ND 0.50 |
| PCB-157 | ND 0.050 | ND 0.50 |
| PCB-169 | ND 0.050 | ND 0.50 |
| PCB-170 | ND 0.050 | ND 0.50 |
| PCB-180 | ND 0.050 | ND 0.50 |
| PCB-183 | ND 0.050 | ND 0.50 |
| PCB-184 | ND 0.050 | ND 0.50 |
| PCB-187 | ND 0.050 | ND 0.50 |
| PCB-189 | ND 0.050 | ND 0.50 |
| PCB-202 | ND 0.050 | ND 0.50 |
| PCB-194 | ND 0.050 | ND 0.50 |
| PCB-195 | ND 0.050 | ND 0.50 |
| PCB-206 | ND 0.050 | ND 0.50 |
| PCB-207 | ND 0.050 | ND 0.50 |
| PCB-209 | ND 0.050 | ND 0.50 |
| Total monoCB | ND 0.050 | ND 0.50 |
| Total diCB | ND 0.050 | ND 0.50 |
| Total triCB | ND 0.050 | ND 0.50 |
| Total tetraCB | ND 0.050 | ND 0.50 |
| Total pentaCB | ND 0.050 | ND 0.50 |
| Total hexaCB | ND 0.050 | ND 0.50 |
| Total heptaCB | ND 0.050 | ND 0.50 |
| Total octaCB | ND 0.050 | ND 0.50 |
| Total nonaCB | ND 0.050 | ND 0.50 |

Notes:

NDx Not detected at or above x.

ATTACHMENT B.1



2055 Niagara Falls Blvd. Suite Three
Niagara Falls, NY 14304 (716)297-2160

ALTA

SAMPLER'S
SIGNATURE: C. Dunnigan

PRINTED

NAME: C. Dunnigan

REMARKS

| SEQ. No. | DATE | TIME | SAMPLE No. | SAMPLE TYPE | CONTAINERS OF 20 LITER JUGS | PARAMETERS |
|-------------|---------|-------------------------|------------------------|----------------|---|---|
| 1 | 1/10/88 | PT-1 | PT-0109 98- CFD - 0021 | SED | 2 | Composite Cull 40E Jars into one sample Cull analysis. |
| 2 | PT-5 | PT- 0105 98- CFD - 0041 | | | 2 | |
| 3 | PT-7 | PT- 0107 98- CFD - 0051 | | | 2 | |
| 4 | PT-9 | PT- 0109 98- CFD - 0071 | | | 2 | |
| 5 | PT-3 | PT- 0103 98- CFD - 0021 | | | 2 | |
| 6 | PT-3 | PT- 0109 98- CFD - 0091 | | | 2 | |
| 7 | PT-11 | PT- 0109 98- CFD - 0121 | | | 2 | Held all 500 ml bottles until notified. |

TOTAL NUMBER OF CONTAINERS

14 HEALTH/ CHEMICAL HAZARDS

| | | | | |
|--------------------|--------------------|---------------|-----------------------------|---------------|
| DISINQUISITION BY: | <i>C. Dunnigan</i> | DATE: 1-10-88 | RECEIVED BY: <i>Melches</i> | DATE: 1-12-88 |
| | | TIME: 1300 | ② | TIME: 10:30 |
| DISINQUISITION BY: | | DATE: | RECEIVED BY: | DATE: |
| | | TIME: | ③ | TIME: |

| | | | | |
|--------------------|--------------------|---------------|-----------------------------|---------------|
| DISINQUISITION BY: | <i>C. Dunnigan</i> | DATE: 1-10-88 | RECEIVED BY: <i>Melches</i> | DATE: 1-12-88 |
| | | TIME: 1300 | ④ | TIME: 10:30 |
| DISINQUISITION BY: | | DATE: | RECEIVED BY: | DATE: |
| | | TIME: | ④ | TIME: |

METHOD OF SHIPMENT: FED-EX c/n

WAY BILL No. ECO 872 878701

| | | | |
|--------|----------------------------|-----------------------------------|---|
| White | -Fully Executed Copy | SAMPLE TEAM: <i>J. Melches</i> | RECEIVED FOR LABORATORY BY: <i>C. Dunnigan</i> |
| Yellow | -Receiving Laboratory Copy | | |
| Pink | -Shipper Copy | | |
| Gold | -Sampler Copy | | |

DATE: 1-12-88 TIME: 10:30

1001 (P) OCT 31/84(NF) REV. 5

C

APPENDIX C

PHYSICAL TESTING DATA

Soil Technology Inc.

Project : Treatek-CRA
 Project No. : J-1115
 Location : Hylebos
 Date : Tue Feb 17 1998

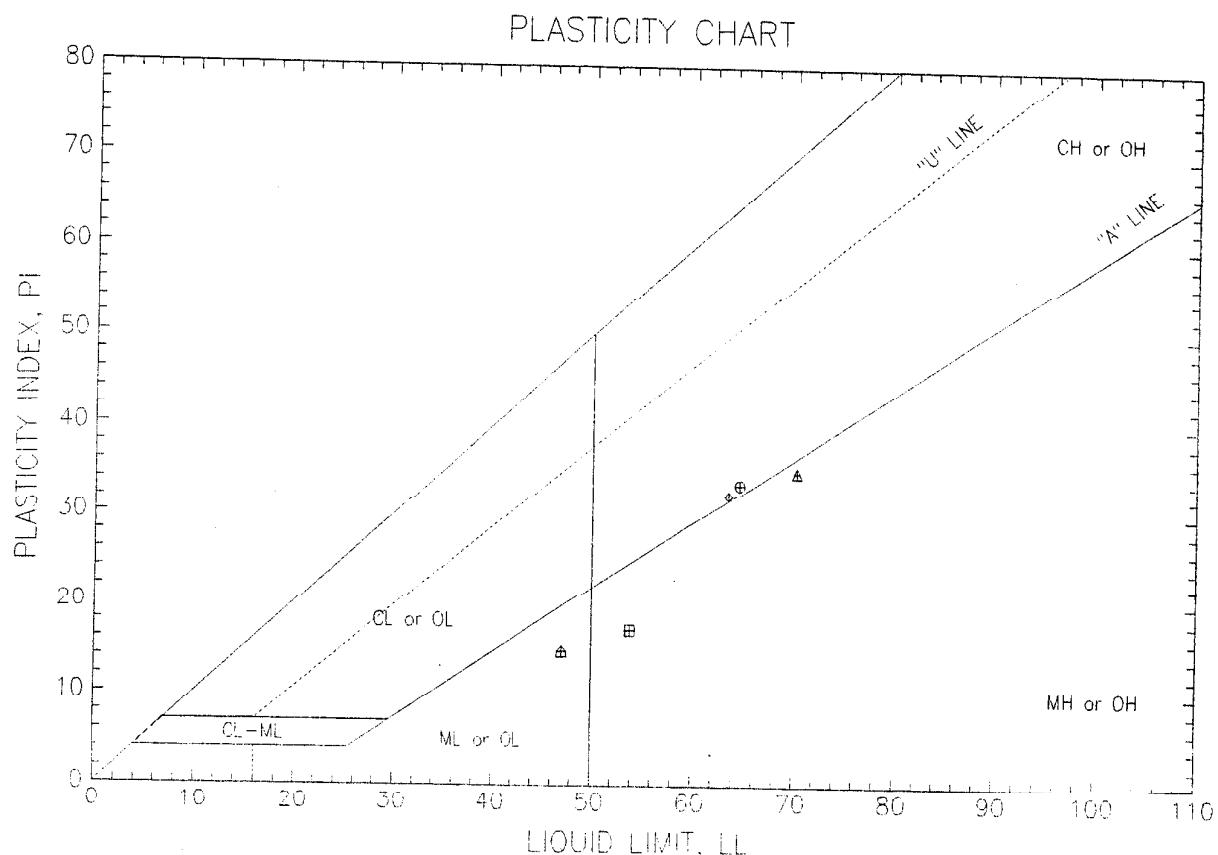
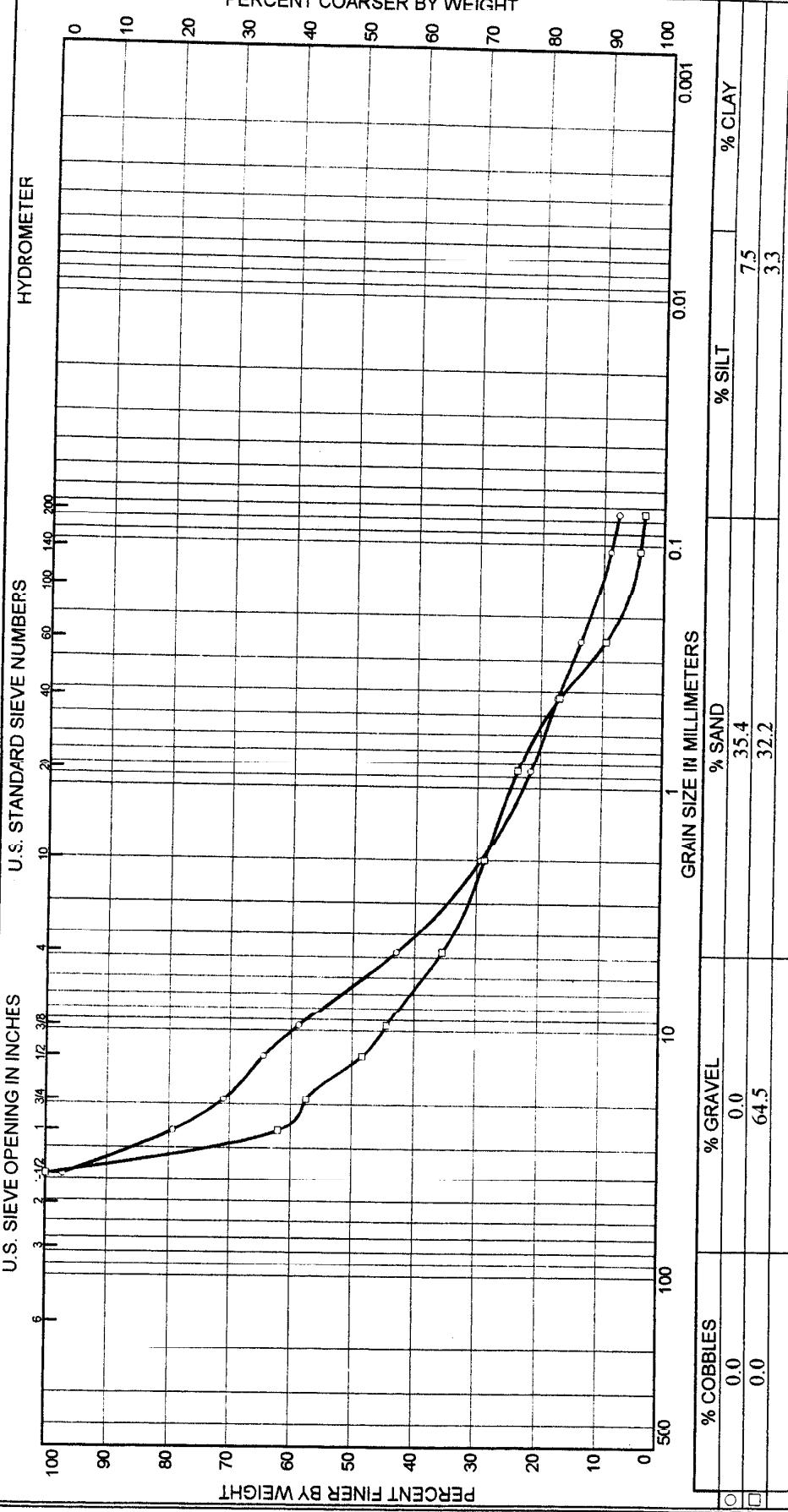


Figure 1

PARTICLE SIZE DISTRIBUTION TEST REPORT

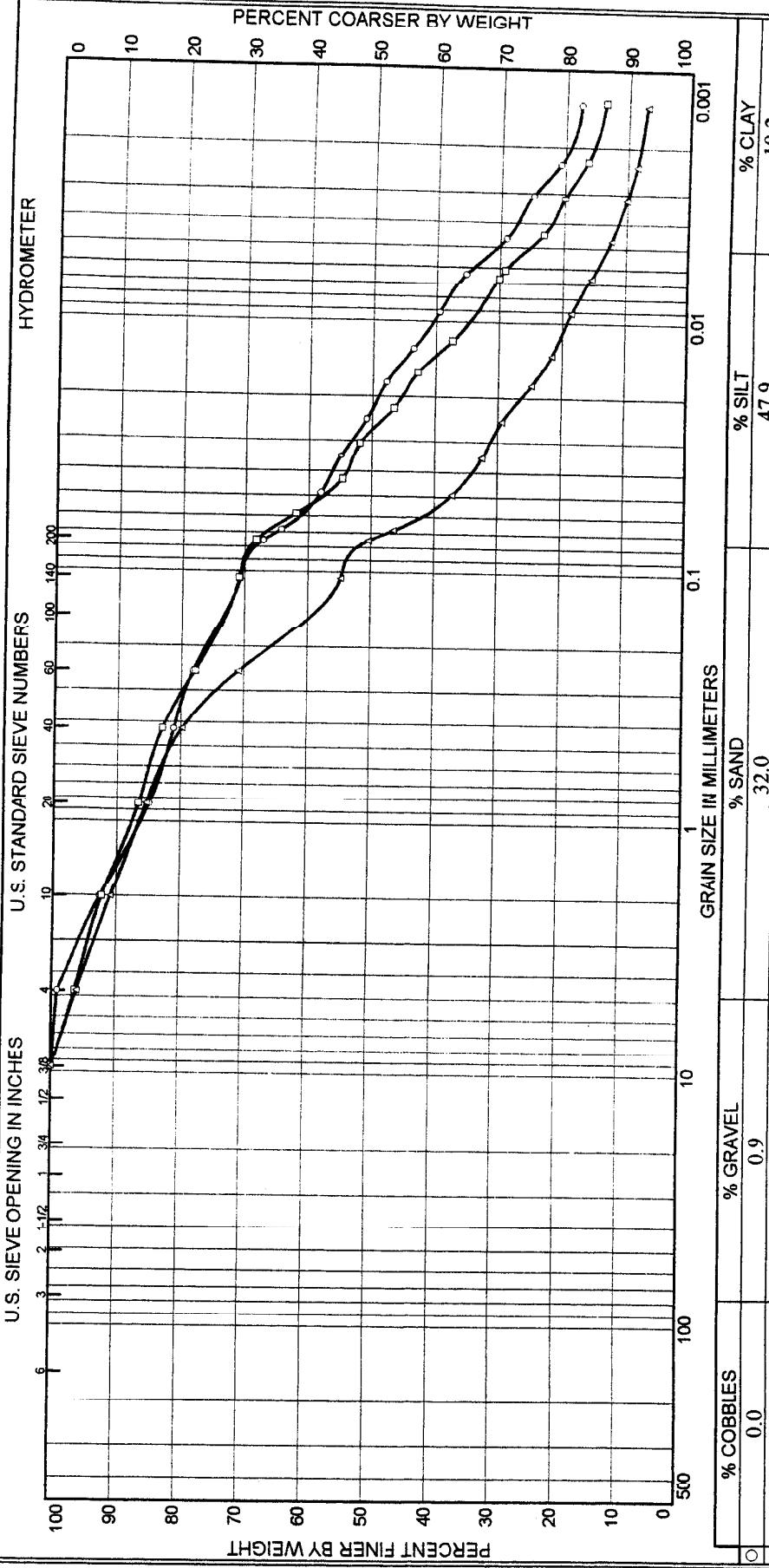


| Source | Sample # | Depth/Elev. | Date Sampled | USCS | MATERIAL DESCRIPTION |
|-------------------|----------|-------------|--------------|-------|---|
| Client TreTek-CRA | CFD-010 | 0.0 | 0.0 | GP-GM | Poorly graded gravel with silt and sand |
| Project | CFD-004 | 0.0 | 64.5 | GP | Poorly graded gravel with sand |

Project No. J-1115 Plate 1

SOIL TECHNOLOGY, INC.

PARTICLE SIZE DISTRIBUTION TEST REPORT



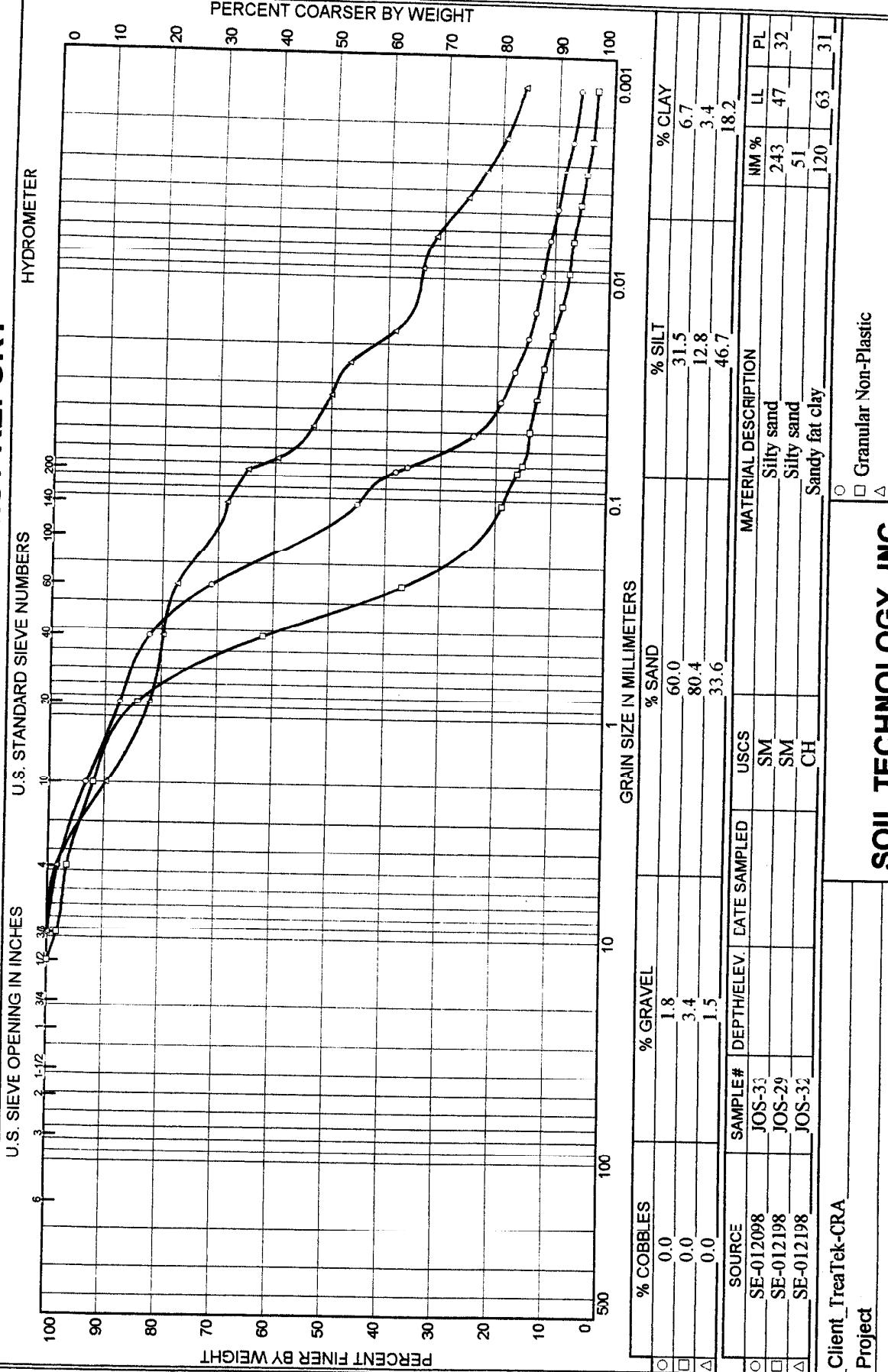
| SOURCE | SAMPLE # | DEPTH/ELEV. | DATE SAMPLED | USCS | MATERIAL DESCRIPTION |
|-------------|----------|-------------|--------------|------|----------------------|
| ○ SE-012098 | JOS-01 | | | OH | Sandy organic clay |
| □ SE-012098 | JOS-07 | | | MH | Sandy elastic silt |
| △ SE-012098 | JOS-15 | | | MH | Sandy elastic silt |

Client TreTek-CRA
Project

Project No. J-1115 Plate 2

○ □ △
SOIL TECHNOLOGY, INC.

PARTICLE SIZE DISTRIBUTION TEST REPORT



SOIL TECHNOLOGY, INC.

Client_TreTek-CRA
Project

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